DECEMBER 1981

American City & County

public works ■ engineering ■ management

C 6185-1

Coping With Hazardous Wastes And Other Emergencies

Plus! 1982 T-L-B Specs

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American City & County

Berkshire Common, Pittsfield, MA 01201

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Russell Gilchrist, publisher

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On the cover: Hazardous waste "surprises" like this one in Chester, Penn., will become more common in the years ahead and put local officials on the hot seat before they're cleaned up.

Municipal Cost Indexes

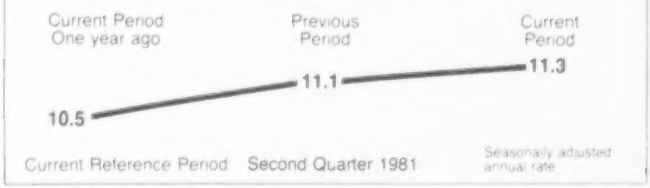
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967 = 100)

ACC MUNICIPAL COST INDEX 299.5 0.8% +10.4%

Consumer Price Index	279.3	1.0%	11.0%
ACC Construction Cost Index	326.2	1.0	8.1
General Construction Materials	302.4	(0.3)	8.2
Motorized Equipment	276.6	0.3	14.3
Energy: Fuels and Power	865.5	(0.6)	22.4
Consumable Supplies	291.4	0.8	12.2
Producer Price Index	271.1	0	7.8

MUNICIPAL TREND TO WATCH

Purchases of Durable Goods, Billions of Dollars



CAPITAL EQUIPMENT 265.6 −0.1% +9.8%

Agricultural Machinery & Equip.	292.0	0.9%	10.6%
Air Conditioners (12/77 = 100)	131.1	0.5	6.0
Construction Machinery & Equip.	326.6	0.5	10.4
Electric Motors	283.1	1.5	10.1
Environmental Controls (6/80-100)	111.6	1.7	10.0
Fans and Blowers (Ex. Portable)	328.4	1.0	9.3
Fluid Power Equipment	225.7	0.9[2]	11.6
Generators and Generator Sets	336.2	0[2]	15.3
Heating Equipment	227.9	0.3[2]	9.1
Industrial Material Handling Equip.	282.4	0.6[2]	10.1
Integrating & Measuring Inst.	203.1	0.3	8.7
Internal Combustion Engines	311.9	2.2%	13.2%
Motor Trucks, Light	229.9	(5.8)	9.4
Motor Trucks, Heavy	291.5	2.8	13.5
Office Machines	149.0	0.1[2]	5.2
Passenger Cars	196.3	(4.4)	7.2
Photographic Equipment	129.6	1.6	3.9
Pumps, Compressors & Equipment	330.1	0.5	12.9
Railroad Equipment	345.0	0[2]	7.8
Refrig. Compressors (12/77 = 100	129.9	1.4[2]	1.6
Switchgear, Switchboard Equip.	248.3	0.2	5.8

INDUSTRIAL COMMODITIES 314.5 +0.1% +9.7%

Abrasive Products	278.6	0.4%[2]	7.8%
Apparel	187.2	0.4	7.0
Asphalt Roofing	400.0	(4.6)	(1.9)
Building Paper and Board	233.7	0	11.2
Coal	510.6	0.7	8.3
Commercial Furniture	261.5	0.9[2]	10.0
Concrete Products	292.9	0	5.6
Diesel Fuel (2/72 = 100)	838.5	(1.3)[2]	18.8
Drugs and Pharmaceuticals	228.2	0.5[2]	7.3
Electric Lamps/Bulbs	276.8	1.2[2]	5.3
Electric Power	382.0	(0.4)	12.9
Electronic Components	170.2	0.1	6.0
Fabricated Structural Metal	300.5	0.2	9.6
Finished Lubricants	346.5	(0.2)[2]	8.0
Finished Steel Products	343.7	0.1	14.8
Flat Glass	218.8	0[2]	9.6
Floor Coverings	181.5	(0.4)	10.7
Footwear	242.0	(0.1)	2.8
Footwear, Rubber	220.3	(0.1)	1.7
Foundry Products	334.1	0.7	6.7
Fuel Oil, No. 2 (2/73 = 100)	870.2	(0.5)	23.9
Gasoline	725.8	(0.1)	11.9
Glass Containers	334.8	0	13.8
Gypsum Products	252.9	(0.9)	0.4
Hand Tools, Power (12/76 = 100)	139.6	(0.3)[2]	8.1
Hardware	265.7	0.9[2]	8.1
Industrial Chemicals	372.0	0[2]	13.6
Kerosene (2/73 = 100)	821.0	(1.8)	20.2
Lumber, Hardwood	257.5	0.1	3.9
Lumber, Softwood	335.2	(3.6)%	(4.1)%
Millwork	271.3	(0.4)	2.6
Mixed Fertilizers	264.9	0.2	8.7
Motor Vehicle Parts	327.0	1.0	27.4
Natural Gas	1166.3	3.7[2]	30.6
Nonferrous Wire and Cable	208.9	0.9	(2.2)
Paint Materials	307.8	(0.2)	10.4
Paper	287.1	1.2	11.0
Paperboard	262.5	0.5	9.6
Pesticides	446.7	0[2]	18.8
Photographic Supplies	268.0	0.3	4.1
Plastic Constr. Prod. (12/69 = 10(	156.6	(0.6)	(1.0)
Plastic Film (12/70 = 100)	205.7	0.1	4.8
Plumbing Fixtures & Brass Fittings	271.4	0.1	8.3
Plywood	241.2	(1.9)	(4.5)
Portland Cement	328.8	(0.2)	5.3
Prepared Paint	251.0	0[2]	4.9
Refractories	308.0	0	13.8
Residual Fuel	1187.7	(4.7)	24.2
Sand, Gravel & Crushed Stone	265.8	0.2	8.5
Sanitary Papers & Health Prod.	349.2	0	4.4
Soaps & Synthetic Detergents	240.1	0.2[2]	7.5
Sporting Goods	215.1	0.5	6.3
Structural Clay Products	254.8	1.8[2]	10.7
Tires and Tubes	256.5	2.2	5.9
Tractor Parts	212.9	0.3[2]	16.4
Transformers & Power Regulators	214.2	0.3[2]	13.2
Valves & Fittings	314.4	0.8	7.3
Wiring Devices	310.7	2.4	15.0

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

JANUARY 1982

American City & County

public ... ering ■ management

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SR-VICE PRESIDENT
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Outlook '82

Still Tighter Budgets Ahead?
What the Experts See

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Local government surpluses rising?

On the cover: Tightfistedness is the suggestion made and that's what our survey of the experts found, but optimism proved also to be abroad in the land.

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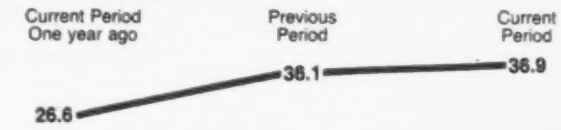
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 301.0 +0.5% +10.2%

Consumer Price Index	279.9	0.2%	10.2%
ACC Construction Cost Index	330.3	1.3	9.3
General Construction Materials	301.3	(0.4)	7.9
Motorized Equipment	282.6	2.2	12.2
Energy: Fuels and Power	854.7	(1.2)	20.7
Consumable Supplies	292.8	0.5	11.6
Producer Price Index	274.0	1.1	7.3

MUNICIPAL TREND TO WATCH

State and Local Surpluses, Billions of Dollars



Current Reference Period: Second Quarter, 1981 — Seasonally adjusted annual rate

CAPITAL EQUIPMENT 271.4 +2.2% +8.9%

Agricultural Machinery & Equip.	292.1	0%	10.1%
Air Conditioners (12/77 = 100)	131.5	0.3	6.3
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Electric Motors	284.1	0.4	10.2
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Coal	511.1	0.1	8.6
Commercial Furniture	262.5	0.4[2]	8.7
Concrete Products	293.3	0.1	5.7
Diesel Fuel (2/72 = 100)	839.4	0.1[2]	19.5
Drugs and Pharmaceuticals	223.0	(2.3)[2]	5.0
Electric Lamps/Bulbs	279.6	1.0[2]	6.6
Electric Power	375.9	(1.6)	11.4
Electronic Components	170.2	0	6.0
Fabricated Structural Metal	302.2	0.6	9.1
Finished Lubricants	347.7	0.3[2]	7.8
Finished Steel Products	347.3	1.0	13.4
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Millwork	271.2	0	2.5
Mixed Fertilizers	263.4	(0.6)	7.4
Motor Vehicle Parts	329.3	0.7	27.8
Natural Gas	1144.1	(1.9)[2]	24.6
Nonferrous Wire and Cable	209.3	0.2	(1.9)
Paint Materials	308.0	0.1	10.2
Paper	288.6	0.5	10.1
Paperboard	262.6	0	9.5
Pesticides	446.7	0[2]	18.8
Photographic Supplies	268.2	0.1	4.2
Plastic Constr. Prod. (12/69 = 100)	155.9	(0.4)	2.4
Plastic Film (12/70 = 100)	206.1	0.2	5.0
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Plywood	234.4	(2.8)	(7.3)
Portland Cement	327.1	(0.5)	4.9
Prepared Paint	251.0	0[2]	4.9
Refractories	308.8	0.3	13.0
Residual Fuel	1174.3	(1.1)	24.4
Sand, Gravel & Crushed Stone	266.8	0.4	8.7
Sanitary Papers & Health Prod.	349.2	0	4.0
Soaps & Synthetic Detergents	240.7	0.2[2]	7.1
Sporting Goods	213.7	(0.7)	5.4
Structural Clay Products	255.6	0.3[2]	9.6
Tires and Tubes	257.7	0.5	5.1
Tractor Parts	213.5	0.3[2]	16.3
Transformers & Power Regulators	214.3	0[2]	11.4
Valves & Fittings	314.2	(0.1)	6.4
Wiring Devices	314.8	1.3	16.1

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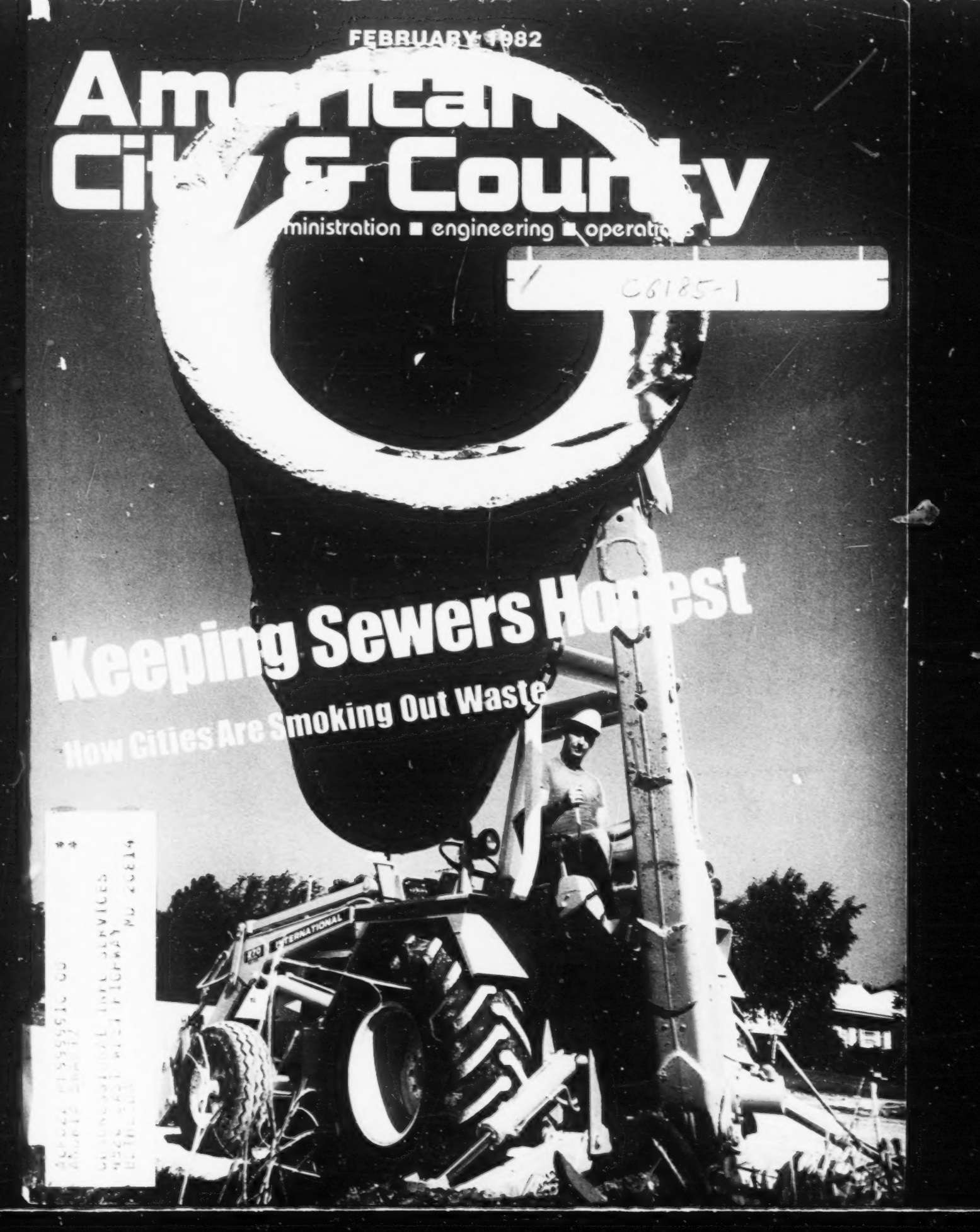
C6185-1

Keeping Sewers Honest

How Cities Are Smoking Out Waste



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96 **MUNICIPAL COST INDEXES:** Upward pressures seem to be easing.

On the cover: Cracks and leaks won't have to be smoked out once this piece of concrete pipe is buried and in service. Photo courtesy of International Harvester.

Municipal Cost Indexes

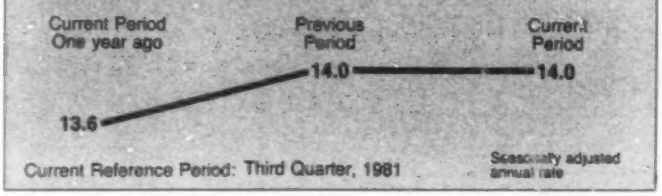
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 302.7 +0.6% +10.3%

Consumer Price Index	280.7	0.3%	9.6%
ACC Construction Cost Index	334.3	1.2	10.7
General Construction Materials	300.6	(0.2)	6.9
Motorized Equipment	284.5	0.7	12.5
Energy: Fuels and Power	859.1	0.5	17.3
Consumable Supplies	294.3	0.5	11.9
Producer Price Index	274.5	0.2	7.1

MUNICIPAL TREND TO WATCH

Purchases of Nondurable Goods, Billions of Dollars



Current Reference Period: Third Quarter, 1981 Seasonally adjusted annual rate

CAPITAL EQUIPMENT 272.9 +0.6% +9.1%

Agricultural Machinery & Equip.	298.7	2.3%	10.0%
Air Conditioners (12/77 = 100)	131.6	0.1	5.8
Construction Machinery & Equip.	329.6	0.2	9.8
Electric Motors	284.1	0	9.9
Environmental Controls (6/80-100)	110.6	(0.2)	5.5
Fans and Blowers (Ex. Portable)	328.8	0	6.7
Fluid Power Equipment	227.8	0[2]	9.5
Generators and Generator Sets	336.3	0[2]	13.9
Heating Equipment	227.6	(0.4)[2]	7.4
Industrial Material Handling Equip.	283.3	0.2[2]	8.5
Integrating & Measuring Inst.	205.1	0	8.6
Internal Combustion Engines	313.0	0.3%	10.8%
Motor Trucks, Light	267.3	0.3	10.8
Motor Trucks, Heavy	295.3	0	12.9
Office Machines	148.0	(0.1)[2]	3.6
Passenger Cars	214.2	0	7.6
Photographic Equipment	129.6	0	4.9
Pumps, Compressors & Equipment	335.7	1.7	11.2
Railroad Equipment	347.5	0.7[2]	7.4
Refrig. Compressors (12/77 = 100)	131.2	1.0[2]	2.7
Switchgear, Switchboard Equip.	251.0	0.8	6.0

INDUSTRIAL COMMODITIES 314.3 −0.1% +8.6%

Abrasive Products	284.4	1.5%[2]	8.9%
Apparel	188.7	0.4	6.7
Asphalt Roofing	408.9	1.9	3.0
Building Paper and Board	231.5	(0.4)	6.9
Coal	513.1	0.4	7.9
Commercial Furniture	263.2	0.3[2]	8.7
Concrete Products	293.2	0	5.6
Diesel Fuel (2/72 = 100)	831.2	(1.0)[2]	18.4
Drugs and Pharmaceuticals	224.8	0.8[2]	4.9
Electric Lamps Bulbs	280.2	0.2[2]	6.3
Electric Power	377.6	0.5	13.1
Electronic Components	170.5	0.2	5.9
Fabricated Structural Metal	302.2	0	8.7
Finished Lubricants	347.9	0.1[2]	7.8
Finished Steel Products	347.2	0	12.7
Flat Glass	218.5	0[2]	7.6
Floor Coverings	180.8	(0.4)	9.2
Footwear	241.1	(0.2)	1.5
Footwear, Rubber	220.5	0	1.6
Foundry Products	336.2	0	5.6
Fuel Oil, No. 2 (2/73 = 100)	848.5	(0.7)	20.4
Gasoline	720.8	(0.5)	12.2
Glass Containers	334.8	0	9.3
Gypsum Products	251.3	(0.4)	(0.8)
Hand Tools, Power (12/76=100)	139.9	(0.1)[2]	7.2
Hardware	268.9	0.5[2]	7.7
Industrial Chemicals	365.6	(1.0)[2]	9.9
Kerosene (2/73 = 100)	822.3	0.6	19.2
Lumber, Hardwood	260.0	0.8	4.8
Lumber, Softwood	319.9	(1.5)%	(7.3)%
Millwork	272.0	0.3	0.7
Mixed Fertilizers	265.4	0.8	7.4
Motor Vehicle Parts	334.0	1.4	29.5
Natural Gas	1168.3	2.1[2]	23.9
Nonferrous Wire and Cable	207.7	(0.8)	(2.6)
Paint Materials	307.4	(0.2)	9.9
Paper	287.1	(0.5)	8.7
Paperboard	261.6	(0.4)	8.2
Pesticides	458.0	2.5[2]	21.8
Photographic Supplies	268.2	0	(0.6)
Plastic Constr. Prod. (12/69 = 100)	152.5	(2.2)	(1.2)
Plastic Film (12/70 = 100)	206.1	0	5.6
Plumbing Fixtures & Brass Fittings	273.0	0.1	8.2
Plywood	233.0	(0.6)	(9.2)
Portland Cement	327.0	0	5.3
Prepared Paint	254.8	1.5[2]	5.6
Refractories	309.8	0.3	13.4
Residual Fuel	1169.5	(0.4)	15.0
Sand, Gravel & Crushed Stone	266.8	0	8.2
Sanitary Papers & Health Prod.	349.2	0	3.3
Soaps & Synthetic Detergents	245.1	1.8[2]	8.9
Sporting Goods	213.4	(0.1)	5.2
Structural Clay Products	255.9	0.1[2]	9.6
Tires and Tubes	257.5	(0.1)	5.0
Tractor Parts	215.9	1.1[2]	9.9
Transformers & Power Regulators	221.5	3.4[2]	15.9
Valves & Fittings	314.8	0.2	6.3
Wiring Devices	316.3	0.5	16.2

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

MARCH 1982

American City & County

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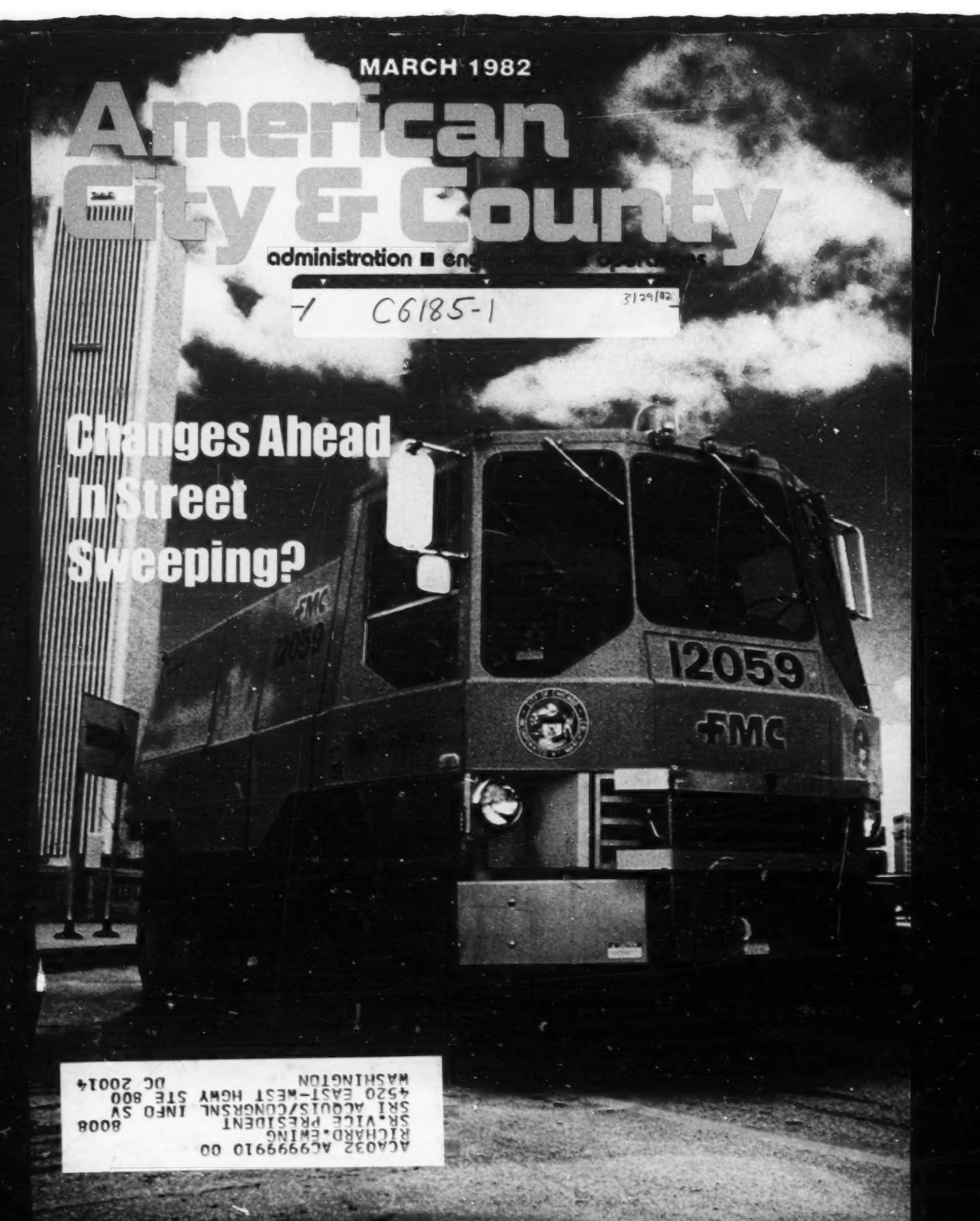
Changes Ahead In Street Sweeping?



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90 **MUNICIPAL COST INDEXES**
MCI up only 0.1% for the month; 8.7% in 12 months

On the cover: The City of Chicago gets its street sweepers on the road as Spring pushes Winter back north. Photo courtesy of FMC Corp.

Municipal Cost Indexes

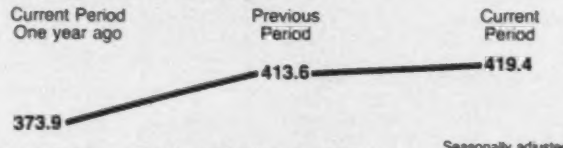
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 303.1 +0.1% +8.7%

Consumer Price Index	281.5	0.3%	8.9%
ACC Construction Cost Index	333.9	(0.1)	8.9
General Construction Materials	301.7	0.4	6.2
Motorized Equipment	285.9	0.5	12.8
Energy: Fuels and Power	871.8	1.5	12.5
Consumable Supplies	295.0	0.2	7.9
Producer Price Index	275.3	0.7	7.0

MUNICIPAL TREND TO WATCH

Receipts, Billions of Dollars



Current Reference Period: **Third Quarter 1981**

Seasonally adjusted annual rate

CAPITAL EQUIPMENT 274.1 +0.4% +9.2%

Agricultural Machinery & Equip.	301.3	0.9%	10.4%
Air Conditioners (12/77 = 100)	132.2	0.5	5.6
Construction Machinery & Equip.	332.0	0.7	10.2
Electric Motors	284.1	0	9.9
Environmental Controls (6/80-100)	111.2	0.5	4.6
Fans and Blowers (Ex. Portable)	328.8	0	6.5
Fluid Power Equipment	234.0	2.7[2]	10.7
Generators and Generator Sets	336.8	0.1[2]	12.7
Heating Equipment	229.2	0.7[2]	7.1
Industrial Material Handling Equip	284.6	0.5[2]	8.5
Integrating & Measuring Inst.	205.9	0.4	8.8
Internal Combustion Engines	312.0	(0.3)%	10.4%
Motor Trucks, Light	267.6	0.1	12.7
Motor Trucks, Heavy	295.3	0	12.9
Office Machines	148.9	0.6[2]	3.6
Passenger Cars	214.9	0.3	8.7
Photographic Equipment	130.0	0.3	5.1
Pumps, Compressors & Equipment	338.4	0.8	10.9
Railroad Equipment	346.3	(0.3)[2]	6.9
Refrig. Compressors (12/77 = 100)	131.3	0.1[2]	2.7
Switchgear, Switchboard Equip.	254.9	1.6	6.3

INDUSTRIAL COMMODITIES 315.1 +0.3% +7.4%

Abrasive Products	285.7	0.5%[2]	9.3%
Apparel	189.1	0.2	6.5
Asphalt Roofing	404.2	(1.1)	2.4
Building Paper and Board	227.7	(1.6)	3.6
Coal	515.6	0.5	8.5
Commercial Furniture	264.1	0.3[2]	9.0
Concrete Products	293.5	0.1	5.7
Diesel Fuel (2/72 = 100)	835.2	0.5[2]	17.4
Drugs and Pharmaceuticals	224.8	0[2]	2.2
Electric Lamps/Bulbs	276.2	(1.4)[2]	6.5
Electric Power	383.8	1.6	13.7
Electronic Components	171.6	0.6	5.9
Fabricated Structural Metal	302.7	0.2	8.4
Finished Lubricants	347.7	(0.1)[2]	7.2
Finished Steel Products	347.5	0.1	11.6
Flat Glass	218.5	0[2]	7.6
Floor Coverings	180.7	(0.1)	5.9
Footwear	241.7	0.2	2.0
Footwear, Rubber	220.5	0	1.6
Foundry Products	337.5	0.4	6.1
Fuel Oil, No. 2 (2/73 = 100)	862.7	1.7	19.5
Gasoline	717.3	(0.5)	10.8
Glass Containers	334.8	0	7.5
Gypsum Products	249.7	(0.6)	(1.2)
Hand Tools, Power (12/76=100)	139.9	0[2]	6.1
Hardware	269.4	0.2[2]	7.0
Industrial Chemicals	364.6	(0.3)[2]	9.0
Kerosene (2/73 = 100)	826.1	0.5	17.4
Lumber, Hardwood	259.0	0.4	4.3
Lumber, Softwood	321.4	0.5%	(9.6)%
Millwork	273.6	0.6	0.1
Mixed Fertilizers	263.6	(0.7)	6.1
Motor Vehicle Parts	334.8	0.2	11.6
Natural Gas	1210.4	3.6[2]	26.8
Nonferrous Wire and Cable	206.7	(0.5)	(2.6)
Paint Materials	307.9	0.2	9.6
Paper	287.5	0.1	6.7
Paperboard	259.3	(0.9)	8.2
Pesticides	458.0	0[2]	21.8
Photographic Supplies	268.4	0.1	(0.4)
Plastic Constr. Prod. (12/69 = 100)	153.4	0.6	(0.2)
Plastic Film (12/70 = 100)	206.1	0	5.7
Plumbing Fixtures & Brass Fittings	273.9	0.3	7.5
Plywood	239.2	2.7	(9.2)
Portland Cement	327.0	0	5.3
Prepared Paint	256.7	0.7[2]	6.3
Refractories	309.8	0	13.4
Residual Fuel	1175.8	0.5	0.8
Sand, Gravel & Crushed Stone	267.2	0.1	8.0
Sanitary Papers & Health Prod.	350.0	0.2	2.2
Soaps & Synthetic Detergents	249.3	1.7[2]	9.2
Sporting Goods	213.8	0.2	3.9
Structural Clay Products	257.1	0.5[2]	10.1
Tires and Tubes	255.9	(0.6)	4.4
Tractor Parts	215.9	0[2]	9.9
Transformers & Power Regulators	218.7	(1.3)[2]	14.4
Valves & Fittings	316.5	0.5	6.4
Wiring Devices	318.9	0.8	15.8

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

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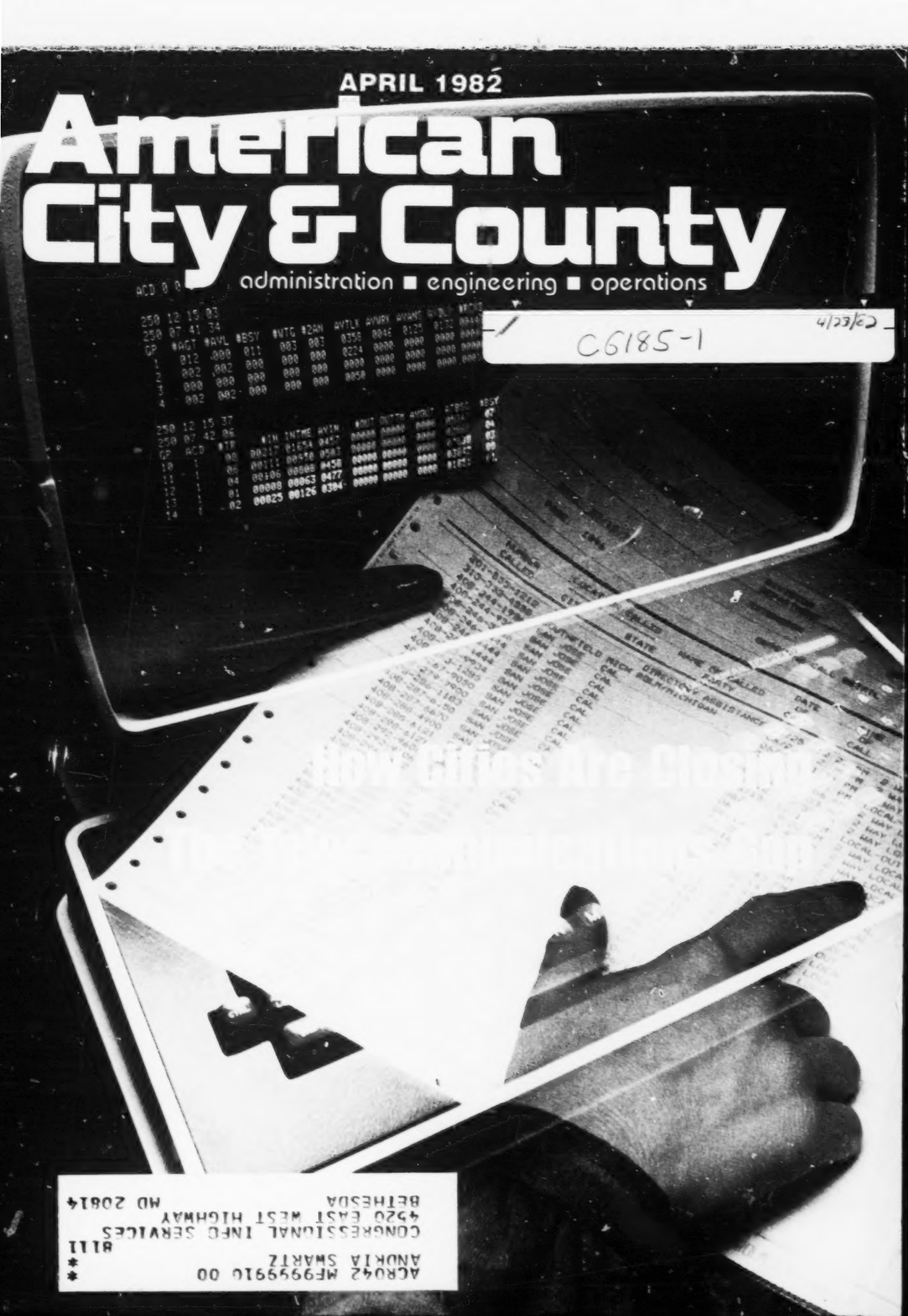

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Purchases of goods and services still climbing

On the cover: Modern telecommunications equipment can be a big help in getting a handle on your telephone bills while also increasing employee productivity. Cover photo courtesy Rolm Corporation, Santa Clara, Calif.

Municipal Cost Indexes

Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

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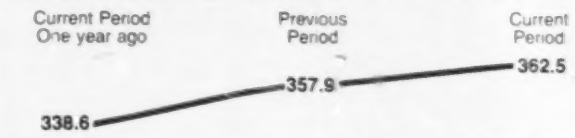

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Agricultural Machinery & Equip.	302.2	0.3%	9.3%	Internal Combustion Engines	317.1	1.6%	9.3%
Air Conditioners (12.77 = 100)	133.9	1.3	6.2	Motor Trucks, Light	268.0	0.1	10.7
Construction Machinery & Equip.	337.0	1.5	10.2	Motor Trucks, Heavy	297.6	0.8	12.1
Electric Motors	285.1	0.4	6.8	Office Machines	149.2	0.2[2]	3.0
Environmental Controls (6.80-100	112.1	0.8	7.4	Passenger Cars	215.3	0.2	7.9
Fans and Blowers (Ex. Portable)	333.8	1.5	8.1	Photographic Equipment	131.2	0.9	5.3
Generators and Generator Sets	338.8	0.6[2]	10.4	Pumps, Compressors & Equipment	341.6	0.9	10.9
Heating Equipment	232.2	1.3[2]	7.2	Railroad Equipment	352.4	1.8[2]	6.0
Industrial Material Handling Equip	286.2	0.6[2]	7.8	Refrig. Compressors (12.77 = 100)	131.3	0[2]	2.7
Integrating & Measuring Inst.	206.9	0.5	8.9	Switchgear, Switchboard Equip.	255.1	0.1	4.7

INDUSTRIAL COMMODITIES 316.6 +0.5% +6.2%

Abrasive Products	285.7	0%[2]	8.3%	Lumber, Softwood	322.3	0.3%	(8.7)%
Apparel	190.1	0.5	5.7	Millwork	276.8	1.2	1.2
Asphalt Roofing	399.7	(1.1)	1.2	Mixed Fertilizers	264.5	0.3	5.1
Building Paper and Board	233.2	2.4	6.1	Motor Vehicle Parts	338.2	1.0	11.2
Coal	526.1	2.0	10.1	Natural Gas	1195.2	(1.3)[2]	23.6
Commercial Furniture	266.6	0.9[2]	8.1	Nonferrous Wire and Cable	206.7	0	(1.6)
Concrete Products	294.8	0.4	3.0	Paint Materials	308.7	0.3	8.7
Diesel Fuel (2.72 = 100)	837.8	0.3[2]	12.7	Paper	288.8	0.5	6.3
Drugs and Pharmaceuticals	224.9	0[2]	2.3	Pesticides	458.0	0[2]	21.8
Electric Lamps Bulbs	275.3	(0.3)[2]	6.3	Photographic Supplies	268.7	0.1	(0.6)
Electric Power	392.5	2.3	15.0	Plastic Constr. Prod. (12.69 = 100)	152.2	(0.8)	(0.8)
Electronic Components	174.4	1.6	6.5	Plastic Film (12.70 = 100)	206.1	0	5.9
Fabricated Structural Metal	303.1	0.1	7.1	Plumbing Fixtures & Brass Fittings	274.4	0.2	6.9
Finished Lubricants	347.8	0[2]	6.6	Plywood	236.8	(1.0)	(5.7)
Finished Steel Products	349.5	0.6	8.9	Portland Cement	336.3	2.8	3.7
Flat Glass	216.0	(1.1)[2]	5.9	Prepared Paint	259.3	1.0[2]	6.8
Floor Coverings	179.6	(0.6)	4.2	Refractories	315.4	1.8	11.6
Footwear	241.4	(0.1)	1.3	Residual Fuel	1231.0	4.7	1.9
Footwear, Rubber	221.4	0.4	1.7	Sand, Gravel & Crushed Stone	273.0	2.2	7.1
Foundry Products	342.0	1.3	5.9	Sanitary Papers & Health Prod.	350.0	0	2.2
Fuel Oil, No. 2 (2.73 = 100)	870.7	0.9	14.5	Soaps & Synthetic Detergents	249.8	0.2[2]	9.4
Gasoline	714.3	(0.4)	8.5	Sporting Goods	219.3	2.6	5.2
Glass Containers	334.7	0	7.5	Structural Clay Products	257.1	0[2]	7.3
Gypsum Products	250.4	0.3	(3.5)	Tires and Tubes	256.6	0.3	6.5
Hardware	271.3	0.7[2]	6.6	Tractor Parts	214.6	(0.6)[2]	8.3
Industrial Chemicals	363.8	(0.2)	5.6	Transformers & Power Regulators	219.2	0.2[2]	13.9
Kerosene (2.73 = 100)	833.8	0.9	12.8	Valves & Fittings	318.8	0.7	6.4
Lumber, Hardwood	259.8	0.3	3.9	Wiring Devices	318.9	0	13.4

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

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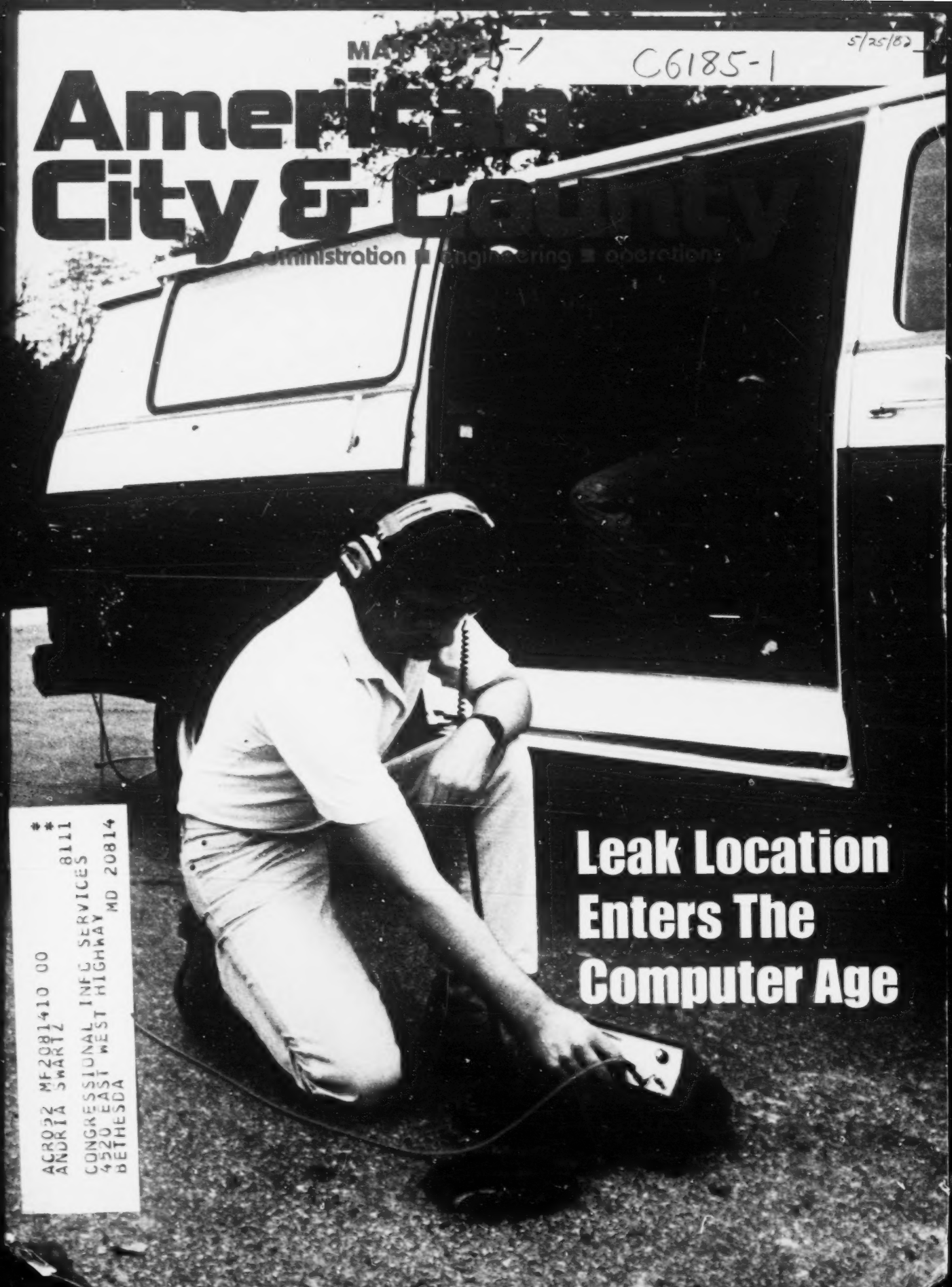

Leak Location Enters The Computer Age

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General lessening of upward cost pressures

On the cover: Getting ready to put the computer to work finding underground leaks, this mobile leak detection team is using a system made by Fluid Conservation Systems, Corp., of Austin.

What's the real story on refuse carts?

Wheeled carts for handling residential solid wastes have been commercially available for about ten years and their advantages have been widely proclaimed, but an exclusive ACC survey shows that relatively few communities have made the switch to this apparently more economical system.

By Donald F. Norris
Center for Applied Urban Research
University of Nebraska at Omaha

In a country that is accustomed to rapid technological changes, many of the products that were introduced ten years ago are almost museum pieces today.

Current models of programmable pocket calculators have the mathematical power of 1970's full-scale computers. Today's municipal fleet manager wonders how anyone could afford to pay for the gas needed to fuel ten-year-old trucks. Ten-year-old wastewater treatment plants often don't even meet today's standards.

But what of another product introduced at that time: the standardized wheeled cart for residential refuse collection? The November 1970 issue of AMERICAN CITY & COUNTY includes an article by Marc Stragier, then public works director in Scottsdale, Arizona. In "We Automated Residential Refuse Collection," Stragier talked about a refuse collection demonstration project funded by the U.S. Bureau of Solid Waste Management in his city.

Perhaps the best-known aspect of the Scottsdale program is the fact that it introduced "Son of Godzilla," the truck that mechanically picked up, emptied, and replaced refuse cans from the curb without the need for swampers. The driver did it all from the truck cab. But the component that made this system possible was a standardized wheeled refuse cart that the homeowner could roll to the curb on collection day.

According to Stragier, the first phase of the demonstration project was the development of these containers and the determination whether householders would use them. This "proved most successful," he said. "Users preferred the municipally furnished containers to the conventional collection system 15 to 1."

The following year, an article that appeared in the July 1971 issue of AMERICAN CITY & COUNTY indicated that refuse carts were not limited to communities that had mechanized refuse-collection vehicles. George Appel, the Mayor of Bella Villa, an incorporated municipality in St. Louis County, Missouri, described refuse pickup in his community. Bella Villa wastes were picked up by a private contractor, Waste-Pak Co. of Arnold, Missouri. After the community agreed to Waste-Pak's suggested trial with wheeled refuse carts, the company equipped its trucks with hydraulic lifts to dump the carts into its Heil rear loaders.

Midway through the trial period and again upon its completion, Waste-Pak interviewed the cart users. On both occasions, approximately 90 percent of the users were favorably disposed toward the system, and more than half were enthusiastic. At the end of the trial period, 60 percent of the householders agreed to purchase the carts at a cost of $45 each — a price that would be the equivalent of more than $120 today.

My own experience with the conversion from conventional collection to a semi-automated cart system in Memphis,

Regional characteristics of cart systems

Region	Number of Systems	Collection agency	Full or partial installation	Semi- or fully automated	Thousands of carts
Southern and Border					
(Alabama, Arkansas, Florida, Georgia, Kentucky, Louisiana, Mississippi, Missouri, North Carolina, South Carolina, Tennessee, Texas, Virginia)	148 M 16 B 14 C 1 MC 1 R 5 U	134 G 42 P 6 GP 3 U	144 F 31 P 3 D 7 U	160 S 19 A 6 U	175.7 A 1396.9 T
Midwestern and Plains					
(Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Nebraska, North Dakota, Ohio, Oklahoma, Wisconsin)	45 M 4 B 1 C 1 R	32 G 19 P	22 F 27 P 1 D 1 U	34 S 17 A	66.6 A 165.3 T
West, Southwest, Mountain					
Alaska, Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Utah, Washington, Wyoming)	40 M 7 B 1 C	33 G 13 P 2 GP	32 F 15 P 1 U	14 S 33 A 1 U	160.2 A 216.6 T
New England & Mid-Atlantic					
Connecticut, Delaware, District of Columbia, Maryland, New Jersey, New York, Penn.	9 M 5 B 1 MC 1 C 2 U	4 G 14 P	6 F 12 P	17 S 1 U	114.4 T

Legend:
A = Fully automated systems or carts in fully automated systems
B = Military base
C = County
D = Demonstration project
F = Full installation; all appropriate residences are using carts
G = Governmental agency collects refuse
M = Municipal installation
P = Private company collects refuse
R = Other
S = Semi-automated collection
T = Total
U = unknown
Combinations of letters = Combinations of services

Refuse carts: Who's using what, where

	Type of Installation	Year Installed	Full or Partial Installation	Container Manufacturer	No. of Containers (k = 1000)	Container Size (gallons)	Vehicle Type, Crew Size	Refuse Collector
ALABAMA								
Alexander City	M	73	F	PPI	5.0k	84	R2	G
Andalusia	M	75	F	PPI	4.0k	84	R2	G
Clanton	M	81	F	RUB	2.3k	85	R3	G
Demopolis	M	80	F	RUB	2.8k	85	R3	G
Haleyville	M	79	F	PPI	460	84	R2	G
Jacksonville	M	78	F	RUB	3.5k	85	R3	G
Montgomery	M	80	P	ZRN	5.0k	82	S	G
	M	81	F	RUB	52.0k	85	R3	G
Muscle Shoals	M	80	F	RUB	3.5k	85	R3	G
Opelika	M	81	F	GAR	9.0k	90	A	G
Reform	M	81	F	ZRN	1.2k	90	S	G
Russellville	M	81	F	RUB	3.0k	85	R3	G
Tallassee	M	81	F	RUB	2.0k	85	R3	G
Tuscaloosa	M	78	F	PPI	21.0k	84	R3	G
Union Springs	M	80	F	RUB	1.6k	85	R3	G
ALASKA								
Ft. Richardson	B	79	F	RUB	200	85	R2	P
ARIZONA								
Casa Grande	M	74	F	RGI	150	90	A	G
Coolidge	M	74	F	RGI	650	90	A	G
El Mirage	M	81	F	HRM	1.0k	90	R3	P
Fort Huachuca	B	79	P	ZRN	3.0k	82	S	P
Huachuca City	M	75	F	RGI	50	90	A	G
Kearny	M	74	F	RGI	925	90	A	G
Luke Air Force Base	B	79	F	RUB	1.1k	85	R2	P
Parker	M	79	P	RGI	25	90	A	G
Phoenix	M	79	P	GAR	40.0k	90	A	GP
	M	75	P	HRM	55.0k	90	A	G
Safford	M	78	F	RGI	1.5k	90	A	G
Scottsdale	M	79-81	F	HRM	5.0k	90	A	P
	M	70	F	RGI	8.0k	80	A	G
Tempe	M	81	P	GAR	1.6k	90	A	G
Tucson	M	79	P	PPI	900	84	S1	G
ARKANSAS								
Forrest City	M	81	F	ZRN	4.0k	90	S	G
Greeves Ferry	M	79	P	PPI	50	84	—	P
Mountain Home	M	78	P	PPI	500	84	S1	P
Rogers	M	—	—	PPI	600	84	R3	P
IOWA								
Davenport	M	78	P	RGI	1.9k	90	A	G
KANSAS								
Coffeyville	M	78	P	PPI	700	84	S1, R1	P
Derby	M	76	P	RUB	600	85	R3	P
Dodge City	M	77	P	PPI	1.1k	84	S1	G
	M	78	P	RUB	600	85	R3	G
Fort Riley	M	78	P	RUB	300	85	R3	P
Fort Riley	B	81	P	ZRN	500	90	S	P
Fort Scott	M	78	P	PPI	200	84	S1	P
Hutchinson	M	79	P	PPI	10.0k	—	R2	G
Liberal	M	77	F	PPI	6.0k	84	S1	G
Rose Hill	M	76	P	PPI	350	84	R1	P
Salina	M	81	F	PPI	10.0k	90	R2	G
Wichita	M	78	P	RUB	3.5k	85	R2	P
KENTUCKY								
Fort Knox	B	78	F	RUB	3.6k	85	R3	P
Goose Creek	M	75	F	ZRN	3.0k	82	S	G
Lexington	MIDI	81	P	ZRN	1.2k	90	S	G
	MIDI	81	P	RUB	925	85	R3	G
LOUISIANA								
Bastrop	M	75	F	ZRN	8.0k	82	S	G
Broussard	M	81	F	ZRN	2.0k	82	S	G
England Air Force Base	B	75	F	ZRN	5.0k	82	S	—
Farmerville	M	76	F	ZRN	2.0k	82	S	G
Ferriday	M	79	F	ZRN	5.0k	82	S	G
Fort Polk	B	77	F	ZRN	5.0k	82	S	P
Franklin	M	76	F	RUB	4.5k	85	R3	G
Haynesville	M	81	F	ZRN	1.4k	82	S	G
Houma	M	78	F	ZRN	19.0k	82	S	G
Independence	M	79	F	ZRN	1.0k	82	S	G
Jonesboro	M	79	F	ZRN	4.0k	82	S	G
Kentwood	M	79	F	ZRN	2.0k	82	S	G
Lake Providence	M	81	F	ZRN	3.0k	82	S	G
Monroe	M	78	F	ZRN	25.0k	82	S	G
New Orleans	M	78	P	ZRN	1.0k	82	S	G
Pope Air Force Base	B	77	P	ZRN	2.0k	82	S	—
Rayville	M	74	F	ZRN	7.0k	82	S	G
St. Joseph	M	79	F	ZRN	3.0k	82	S	G
Sulphur	M	79	F	ZRN	6.0k	82	S	G
W. Monroe	M	79	F	ZRN	8.0k	82	S	G
PENNSYLVANIA								
Carlisle Barracks	B	78	F	RUB	300	85	R2	P
Pleasant Hall	—	77	P	PPI	3.0k	—	R3	P
SOUTH CAROLINA								
Bishopville	M	80	F	ZRN	4.0k	82	S	—
Camden	M	79	F	ZRN	2.0k	82	S	P
Cheraw	M	79	F	RUB	2.7k	85	R3	G
Chester	M	79	F	RUB	2.8k	85	R3	G
Clinton	M	79	F	RUB	3.0k	85	R3	G
Columbia	M	80	F	RUB	27.5k	85	R3	G
Conway	M	82	F	RUB	3.7k	85	R3	G
Florence	M	81	F	ZRN	10.0k	90	S	G
Fountain Inn	M	79	F	ZRN	3.0k	82	S	G
Greenville	M	77	F	ZRN	30.0k	82	S	G
Greenwood	M	80	F	RUB	8.8k	85	R3	G
Greer	—	79	P	RUB	2.4k	85	R2	P
	M	79	F	ZRN	5.0k	82	S	G
Lake City	M	80	F	ZRN	3.0k	82	S	G
Lake View	M	80	F	ZRN	4.0k	82	S	G
Lancaster	M	79	F	ZRN	6.0k	82	S	G
Laurens	M	78	F	ZRN	4.0k	82	S	G
Mauldin	M	78	F	ZRN	4.0k	82	S	G
McColl	M	73	F	ZRN	3.0k	82	S	G
Myrtle Beach	M	79	F	ARS	5.0k	—	—	G
Rock Hill	M	80	F	ARS	13.0k	—	—	G
Shaw Air Force Base	B	79	F	RUB	800	85	R2	P
Simpsonville	M	78	F	ZRN	4.0k	82	S	G
Travelers Rest	M	79	F	ZRN	3.0k	82	S	G
Union	M	79	F	ZRN	8.0k	82	S	G
Walterboro	M	76	F	RGI	1.8k	90	A	G
TENNESSEE								
Johnson City	M	80	P	ZRN	2.0k	82	S	G
	M	79	P	RUB	800	85	R3	G
Kingsport	C	79	P	ZRN	2.0k	82	S	P
Manchester	M	81	P	HRM	1.0k	90	A	G
Maryville	M	80	F	ZRN	6.0k	82	A	G
Memphis	M	80,81	F	RUB, PPI, ZRN	180.0k	85	R3	G

CALIFORNIA

Beverly Hills	M	78	P	RGI	500	90	A	G
	M	81	P	GAR	5.0k	90	A	G
Camp Pendelton	B	78	F	RGI	3.2k	90	—	G
Delano	M	76	—	RGI	150	90	A	G
Fort Ord	B	79	P	ZRN	5.0k	82	S	P
Fresno	M	76	P	RGI	1.0k	90	A	G
Marysville	M	31	P	RUB	3.1k	85	S1	P
Monterey	M	77	P	RUB	1.9k	85	S1	P
Sacramento City	M	81	P	HRM	4.5k	90	A	G
Shafter	M	76	F	RGI	200	90	A	G
Taft	M	75	F	RGI	200	90	A	G
Travis Air Force Base	B	77	F	RUB	1.8k	85	R2	P
Wasco	M	77	F	RGI	500	90	A	G

COLORADO

Fort Carson	B	75	F	ZRN	3.0k	82	S	P
	B	81	P	RUB	250	85	S2	P
Longmont	M	76	F	PPI	15.0k	84	S1	G

CONNECTICUT

Kent	—	77	P	PPI	1.0k	84	—	P

DELAWARE

Dover Air Force Base	B	75	F	ZRN	3.0k	82	S	P
Wilmington	M	76	P	RUB	900	85	R3	P
	C	73	P	ZRN	11.0k	82	S	P

FLORIDA

Blountstown	M	78	P	ZRN	500	82	S	G
Clearwater	M	78	P	RGI	1.4k	90	A	G
	M	81	F	GAR	20.0k	90	A	G
Dade County	M	70	P	ZRN	10.0k	82	S	G
Daytona Beach	M	80	F	RUB	17.0k	85	R3	GP
Fernandina Beach	M	76 81	F	RUB	1.0k	85	R3	G
	M	71	F	ZRN	8.0k	82	S	G
Fort Lauderdale	M	73	F	RUB	52.0k	85	R3	GP
	M	79	F	ZRN	10.0k	82 90	S	G
	M	81	P	RGI	19.0k	90	A	G
Fort Pierce	M	80	F	RGI	12.3k	90	A	G
Fort Walton Beach	M	81	P	RUB	900	85	S2	G
	M(D)	80	P	TKY	400	90	A	G
Leesburg	M	77	F	ZRN	4.0k	82	S	G
Maitland	M	75	F	PPI	2.3k	84	R2	G
Miami Springs	M	77	F	RGI	3.6k	90	A	G
N. Miami Beach	M	77	F	RGI	6.1k	90	A	G
Pahokee	M	76	F	RGI	1.0k	90	A	G
Palatka	M	77	P	RUB	300	85	R3	G
	M	77	F	ZRN	6.0k	82	S	G
Pensacola	M(D)	81	P	TKY	400	90	A	G
Rockledge	M	73	F	PPI	4.0k	84	R2	G
St. Petersburg	M	82	F	RGI	43.3k	90	A	G
Stuart	M	76	F	PPI	3.0k	84	R2	G
Tallahassee	M	79	F	RGI	21.6k	90	A	G
Winter Garden	M	74	F	PPI	—	84	—	G
Winter Haven	M	80	F	ZRN	1.0k	82	S	—
	M	72	F	PPI	7.9k	84	S2	G

MARYLAND

College Park	M	81	F	RUB	4.0k	85	R3	G
Hampstead	M	80	P	RUB	400	85	R2	P
Landover Hills	M	79	P	RUB	600	85	R2	P
Westminster	M	80	P	RUB	1.1k	85	R2	P
Williamsport	M	80	P	RUB	3.0k	85	S1	P

MICHIGAN

Detroit	M	81	P	GAR	30.0k	90	A	G

MINNESOTA

Ely	M	77	F	RGI	200	90	A	G
Hopkins	M	81	F	RGI	14.5k	90	A	P
Minneapolis	M	80	P	ZRN	4.0k	82	S	P
Mt. Iron	M	79	F	RGI	1.3k	90	A	G
Virginia	M	79	F	RGI	500	90	A	G

MISSISSIPPI

Clarksdale	M	78	F	RGI	6.5k	90	A	G
DeSoto County	M	78	F	RUB	7.5k	85	R3	G
Greenville	M	81	F	RGI	15.5k	90	A	G
Grenada	M	81	F	ZRN	—	90	S	G
	M	77	F	RUB	5.0k	85	R3	G
Indianola	M	78	F	ZRN	2.0k	82	S	G
Moss Point	M	74	F	PPI	5.5k	84	R2	G
Tupelo	M	78	F	RUB	11.0k	85	R3	G
Winona	M	78	F	RUB	3.5k	85	R3	G
Yazoo City	M	80	F	ZRN	8.0k	82	S	G

MISSOURI

St. Ann	M	80	P	ZRN	6.0k	90	S	G
St. Louis	M	77	P	RUB	7.0k	85	R2	P
	M	81	P	PPI	600	90	S1	G
University City	M	78	P	PPI	150	84	S1	G

MONTANA

Havre	M	76	F	RGI	100	90	A	G
Laurel	M	78	F	RGI	1.8k	90	A	G

NEBRASKA

Alliance	M	78	F	RGI	2.7k	90	A	G
Kearney	M	74	F	RGI	200	90	A	G
McCook	M	76	F	RGI	900	90	A	G
Sidney	M	76	F	RGI	1.1k	90	A	G

NEVADA

Nellis Air Force Base	B	79	F	RUB	1.7k	85	R2	P
Reno	M	77	F	RUB	14.5k	85	R2	P

NEW JERSEY

Atlantic City	M	81	P	RUB	6.0k	85	R3	G
Fort Dix	B	75	F	ZRN	3.0k	82	S	P
Glassboro	M	81	P	RUB	1.5k	85	R3	G

NEW MEXICO

Grants	M	75	F	RGI	2.8k	90	A	G

NEW YORK

Fort Hamilton	B	75	F	ZRN	3.0k	82	S	P
Schenectady	C	75	P	ZRN	3.0k	82	S	P
Webster	M	78	P	RUB	1.2k	85	R2	P

TEXAS

Cedar Park	M	80	P	RUB	500	85	R3	P
Fort Bliss	B	79	F	ZRN	6.0k	82	S	P
Fort Sam Houston	B	78	F	RUB	1.5k	85	R2	P
Kilgore	C	78	P	ZRN	3.0k	82	S	P
Marlin	M	79	F	RUB	3.3k	85	R3	G
Silsbee	M	81	F	ZRN	3.0k	90	S	G
Texas City	C	79	P	ZRN	2.0k	82	S	P

UTAH

Cedar City	M	81	F	RGI	3.0k	90	A	G
Payson	M	80	F	RGI	2.5k	90	A	G

VIRGINIA

Arlington	C	77	P	ZRN	2.0k	82	S	P
Fort Belvoir	B	78	F	RUB	1.4k	85	R2	P
Fort Eustis	B	76	F	RUB	1.6k	85	R2	P
Fort Lee	B	79	F	RUB	1.7k	85	R2	P
Fort Monroe	B	76	F	RUB	300	85	R2	P
Hampton	M	79	F	ZRN	2.0k	90 82	S	G
	M	76	F	RUB	34.0k	85	R3	G
Hopewell	M	78	P	ZRN	500	82	S	P
	M	80	F	RUB	8.0k	85	R3	G
Langley Air Force Base	B	75	F	RUB	2.1k	85	R2	P
Newport News	M	81	P	ZRN	1.0k	90	S	G
	M	79	P	RUB	500	85	R3	G
Richmond	M	81	P	RUB	3.3k	85	R3	G
Salem	M	81	F	RUB	8.0k	85	R3	G

WASHINGTON

Grandview	M	80	F	RGI	1.2k	90	A	G
Pasco	C	74	P	ZRN	1.0k	82	S	P
Sequim	M	77	F	RGI	300	90	A	G
Shelton	M	78	F	RGI	1.2k	90	A	G
Tacoma	M	78	P	RGI	100	90	A	G
Toppenish	M	79	F	RGI	700	90	A	G
Walla Walla	M	76	F	RGI	—	—	A	G

WASHINGTON, D.C.

Andrews Air Force Base	B	78	F	RUB	2.5k	85	R2	P
City of Washington, D.C.	M	81	P	RUB	62.0k	85	R3	G

WISCONSIN

Kenosha	M	77	P	PPI	150	84	R2	G
Milwaukee	M(D)	81	P	ZRN	4.0k	90	S	G
	M(D)	81	P	RUB	2.6k	85	R3	G
Shorewood	M	75	F	PPI	6.0k	84	S1	G

WYOMING

Casper	M	80	P	GAR	2.0k	90	A	G
	M	81	P	HRM	4.5k	90	A	G
Sheridan	M	81	P	HRM	1.0k	90	A	G

MATCH LINE FOR PAGE 36

MATCH LINE

Tennessee, demonstrated to me the advantages of this system and led me to wonder how widespread was its use. In conjunction with this magazine, I decided to conduct a survey that would determine the number of locations where refuse was collected using wheeled carts of from 80 to 90 gallons capacity.

Unlike a recent survey in another magazine, this study would exclude installations of 150- and 300-gallon containers used in mechanized front-loading and side-loading systems. These larger containers typically are used for collecting wastes from commercial and multiple-occupancy residential buildings, and not from locations traditionally considered when discussing residential collection.

Responses were solicited from the nine known manufacturers and vendors of these systems:

- American Refuse Systems
- EMCO
- David A. Garofalo and Associates
- Heil Rotomold, Inc.
- PPI Industries
- Reuter, Inc.
- Rubbermaid Applied Products, Inc.
- Turn-Key Container Systems, Inc.
- Zarn, Inc.

With the sole exception of EMCO, all the manufacturers and vendors responded. Heil Rotomold reported that it had acquired Fiberglass Specialists, but was unable to include data from this company's customer list. Garofalo noted that it had replaced Maxon and Hollowform in the container business. Reuter reported that it marketed not only its own automated container system, but also that of Government Innovators.

The survey produced some surprising and interesting results. Perhaps the most significant of these is the relatively poor acceptance of cart systems, despite their more than ten years of availability and the reported satisfaction of the users. Only 261 local governments have implemented cart-based systems, of a total of 9300 U.S. cities and counties with populations of more than 2500 people. This represents a scant 2.8 percent of the local governments where cart systems might be applicable.

In addition to the 261 local government jurisdictions, 41 military bases and other entities are using cart-based refuse-collection systems.

Of this total of 302 systems, 204 are permanent installations covering all portions of the collection area where carts are appropriate. At 85 other locations, only part of the system has been converted to carts. Finally, four of the reported systems are demonstration projects.

The trend toward implementing cart systems shows no apparent signs of strengthening. In fact, it may already have peaked. Last year, 39 communities implemented cart systems. This compares to 44 communities in 1980 and 59 communities in 1979, the year that saw the largest number of new installations. In 1978, '77, '76, and '75, the numbers of known cart systems implemented were 46, 32, 23, and 16, respectively.

Another conspicuous revelation from the responses was the regional distribution of cart systems. Although carts are in use from Florida to Alaska and from California to Connecticut, more than 61 percent of the installations — 85 sites —are in 13 southern and border states. Further, of these 185 sites, 109 (59 percent) are in the four states of North and South Carolina, Georgia, and Florida. Nearly 900,000 of the 1.9 million carts in use in the United States are in these four states.

The next greatest concentration of carts is in the 11 midwestern and Great Plains states. In these states are 51 sites, or 17 percent of the nation's total. The western and mountain states have 48 sites, or 16 percent of the total, and the New England and mid-Atlantic states, 18 sites, or 5.9 percent of the total.

If the data are analyzed in terms of numbers of carts, rather than numbers of installations, the results are skewed by a small number of installations with very large numbers of carts. Memphis, Tennessee, with 180,000 carts, has more than many states or even entire regions. Other large installations include Atlanta, Georgia, with 115,000 carts; Phoenix, Arizona, with 105,000; Ft. Lauderdale, Florida, with 81,000; Washington, D.C., with 62,000; and Detroit, Michigan, with 30,000.

It is clear from the distribution of the existing systems that neither geography, topography, nor climate appear to be factors hindering the use of carts. They are found throughout the country.

One more interesting — if not surprising — finding is that of the 302 reported sites, only 69, or 23 percent, are fully automated. Fully automated is defined as a system that is operated by a driver who does not move from behind the wheel, but picks up refuse containers, empties them into the packer, and returns them to the curbside by operating a mechanical attachment to the truck.

The alternative to full automation is partial automation. In these systems, collectors wheel a cart to the side of the truck and attach it to a mechanized device called a flipper. They then actuate the flipper, which hoists and dumps the cart and returns it to the ground. The collector then detaches the cart and returns it to the curb. Flippers may be attached to side-loading or to rear-loading trucks.

One cart supplier appears to dominate the fully automated market. Reuter supplies at least in part the carts for 59 of the 69 fully automated systems. Thirty of these systems are in the western and mountain states, while 15 are in the south. The remainder are scattered throughout the country. Of the total 1.9 million carts in the country, 21 percent are in fully automated systems.

Municipal crews pick up the refuse in the majority of all cart installations — 203 or 67 percent — including all of the largest installations. Private collectors operate 88 cart-based collection systems, both automated and semi-automated.

Finally, in most cases, carts at a given installation were acquired from a single vendor. Of the 302 sites, only 29 had carts supplied by two vendors, and only three locations had carts from three vendors.

While some interesting conclusions may be reached from these summaries of the data, perhaps the greatest value of the survey is in the individual entries. They show that cart systems are being used from the sunbelt to the snowbelt, from the plains to the mountains, and from the large urban to the small rural community.

Administrators who reject cart systems on the grounds that tightening budgets make major capital expenditures unfeasible should take a close look at the quick return on their investment. Memphis, Tennessee, the site of the largest cart-based system implemented to date, estimates that the payback period for its conversion will be less than one year.

Most observers agree that cart systems, whether automated or semi-automated, provide substantial improvements over conventional collection systems. Unit costs are generally lower and collection productivity higher, with the savings quickly repaying the initial conversion expenses.

Cart systems offer other advantages, too. On-the-job injuries and related costs may be substantially reduced.

If cart systems offer better service at lower costs and with improved employee working conditions, why is the movement progressing so slowly?

We can only assume that more cart systems have not been implemented because of the conservatism and resistance to change often found in local government. Perhaps this publication of the facts about all of the cart systems currently operational will help to provide the impetus needed to motivate more communities to look carefully at this money-saving option. **ACC**

Note: The author plans to computerize this information for regular updating. He invites corrections and additions, which may be sent to him either directly or through AMERICAN CITY & COUNTY.

MATCH LINE FOR PAGE 31

MATCH LINE

GEORGIA

Americus	M	72	F	PPI	4.0k	84	R2	G
Atlanta	M	73	F	ZRN	115.0k	82	S	G
Bainbridge	M	78	F	RGI	3.5k	90	A	G
Bibb County	C	77	F	RUB	2.0k	85	R3	G
Blakely	M	79	F	PPI	2.0k	84	R2 S2	G
Camilla	M	78	F	ZRN	6.0k	82	S	G
Carrollton	M	74	F	PPI	5.0k	84	R2	G
Cochran	M	79	F	RUB	2.1k	85	R3	G
Commerce	M	73	F	PPI	1.5k	84	R2	G
Conyers	C	79	F	ZRN	4.0k	82	—	P
	M	77	P	RUB	1.0k	85	R3	P
Douglasville	C	77	F	ZRN	4.0k	82	S	P
Dublin	C	78	F	ZRN	2.0k	82	S	P
Eden	C	79	F	ZRN	3.0k	82	S	P
Evans	M	81	P	RGI	800	90	A	G
Fairburn	C	78	F	ZRN	5.0k	82	S	P
Fort Gordon	B	77	F	ZRN	3.0k	82	S	P
Fort McPherson	B	77	F	ZRN	3.0k	82	S	P
Fort Steward	B	79	F	RUB	2.7k	85	R2	P
Garden City	M	—	F	RUB	800	85	R3	G
Leslie	M	74	F	PPI	150	84	R1	G
Macon	M	77	F	RUB	34.0k	85	R3	G
Marietta	C	79	P	ZRN	1.0k	82	S	P
Milledgeville	M	81	F	ZRN	4.0k	90	S	G
Monroe	C	78	F	ZRN	1.0k	82	S	P
Nashville	M	74	F	PPI	1.8k	84	R2	G
Ocilla	M	—	F	RUB	1.5k	85	R3	G
Oxford	C	79	F	ZRN	2.0k	82	S	P
Perry	M	79	F	RUB	3.3k	85	R3	G
Plains	M	76	F	PPI	400	84	R2	G
Snellville	M	79	F	ZRN	8.0k	82	S	P
Toccoa	M	76	F	RUB	4.3k	85	R3	G
Wentworth	M	80	F	ZRN	2.0k	82	S	G

IDAHO

American Falls	M	76	F	RGI	800	90	A	G
Burley	M	79	F	RGI	1.1k	90	A	G
Soda Springs	M	81	F	RGI	1.1k	90	A	G
Weiser	M	79	F	RGI	1.1k	90	A	G

ILLINOIS

Blue Island	M	80	P	RUB	1.8k	85	S1	P
Glen Allen	C	79	P	ZRN	3.0k	82	S	P
Kankakee	M	80	P	RUB	1.0k	85	R2	P
Madison	M	80	F	ZRN	2.0k	82	S	G
	M	81	P	RUB	300	85	R3	G
Markham	M	78	F	RGI	4.0k	90	A	G
Park Forest	R	80	P	RGI	300	90	A	P
Scott Air Force Base	B	76	F	ZRN	4.0k	82	S	P
Silver Lake	M	80	P	RUB	1.5k	85	R2	P

INDIANA

Fort Wayne	M	79	—	RGI	800	90	A	P
Indianapolis	M	80	P	RGI	1.3k	90	A	G
Kokomo	M	78	P	RUB	600	85	R3	P
Ligonier	M	79	P	RUB	300	85	R2	G

NORTH CAROLINA

Albemarle	M	76	F	RUB	6.0k	85	R3	G
	M	81	F	ZRN	2.0k	90 82	S	G
Apex	C	80	F	ZRN	1.0k	82	S	P
Asheville	M	79	P	RUB	600	85	R3	G
Carrboro	M	80	F	RUB	1.8k	85	R3	G
Cherryville	M	74	F	PPI	1.9k	84	R2	G
Clayton	M	80	F	RGI	1.5k	90	A	G
Duke Univ.	R	80	P	ZRN	500	90	S	P
Fayetteville	M	78	P	RUB	2.0k	85	R3	G
	M	79	F	ZRN	23.0k	82	S	G
Fort Bragg	B	75	F	ZRN	6.0k	82	S	P
Garner	C	75	F	PPI	2.5k	84	S2	G
	C	76	F	ZRN	6.0k	82	S	P
Gibsonville	M	77	P	PPI	400	84	S2	G
Havelock	M	76	F	RUB	1.5k	85	R3	G
Hendersonville	M	80	F	ZRN	6.0k	82	S	G
High Point	M	—	F	RUB	25.0k	85	R3	G
	M	80	F	ZRN	1.0k	82	S	G
Madison	M	80	P	ZRN	1.0k	82	S	G
Monroe	M	80	P	ZRN	1.0k	82	S	G
	M	75	F	RUB	7.8k	85	R3	G
Morehead City	M	79	F	ZRN	3.0k	82	S	G
Nags Head	M	74	P	ZRN	2.0k	82	S	P
Norwood	M	77	F	PPI	900	84	R2	G
Reidsville	M	81	P	ZRN	1.0k	82	S	G
Rocky Mount	M	76	P	PPI	520	84	R2	G
Rolesville	M	78	F	PPI	160	84	S1,R2	P
Rural Hall	M	80	F	ARS	1.2k	—	—	G
Sanford	M	79	F	ARS	5.0k	—	—	P
Smithfield	—	77	F	ZRN	5.0k	82	S	P
Southport	M	79	F	RGI	1.0k	90	A	G
Toast	M	77	P	RUB	500	85	R2	P
Wendell	M	80	F	ZRN	3.0k	82	S	G
Wilmington	—	79	F	ZRN	5.0k	82	S	G
	—	79	P	RUB	400	85	R3	P
Wilson	M	81	F	ZRN	14.0k	82	S	G
Zebulon	—	77	F	ZRN	4.0k	82	S	P

NORTH DAKOTA

Dickinson	M	81	P	TKY	3.0k	90	A	G
Williston	M	78	F	RGI	350	90	A	G

OHIO

Columbus	M	79	P	ZRN	3.0k	82	S	G
Dayton	M	81	P	GAF	3.5k	90	A	G
Marietta	M	74	F	ZRN	2.0k	82	S	G

OKLAHOMA

Clinton	M	76	P	PPI	1.2k	84	S1	G
Duncan	M	79	F	PPI	9.0k	84	S1	G
El Reno	M	78	F	PPI	4.0k	84	S1	G
Fort Sill	B	78	F	ZRN	4.0k	82	S	P
Owasso	M	79	F	PPI	2.4k	84	S1	G
Seminole	M	80	P	PPI	900	84	S1	G
Sulphur	M	81	F	PPI	2.0k	90	R3	G
Tinker Air Force Base	B	77	F	ZRN	3.0k	82	S	P
Tulsa	M(D)	81	P	RUB	2.0k	85	R3	G

Notes:

Data include only installations of standardized, wheel-type containers of 80-to 90-gallon capacity for automated or semi-automated collection. Data provided by cart system vendors.

Type of installation:

M = municipal; C = county; B = military base; R = Other; Demonstration Project.

Manufacturer:

ARS = American Refuse Systems, Inc.; GAR = David P. Garofalo, and Associates; HRM = Heil Rotomold, Inc.; PPI = PPI Industries, Inc.; RGI = Reuter, Inc.; RUB = Rubbermaid Applied Products, Inc.; TKY = Turn-key Container Systems, Inc.; ZRN = Zarn, Inc.

Vehicle type and crew size:

A = fully automated

S = semi-automated, other particulars unknown

R1, R2, R3 = rear loader, semi-automated, with one-two-, or three-man crew S1, S2 = side loader, semi-automated, with one- or two-man crew.

Who collects refuse:

G = governmental unit; P = private collector; GP = combination

Municipal Cost Indexes

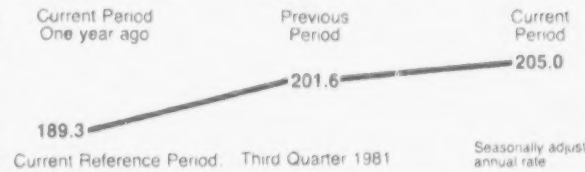
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 305.2 +0.3% +8.0%

Consumer Price Index	283.4	0.3%	7.7%
ACC Construction Cost Index	336.5	0.3	9.9
General Construction Materials	306.2	0.4	4.0
Motorized Equipment	287.5	(0.2)	9.1
Energy: Fuels and Power	875.4	(0.9)	8.3
Consumable Supplies	298.1	0.6	7.5
Producer Price Index	277.4	0	5.4

MUNICIPAL TREND TO WATCH

Employee Compensation, Billions of Dollars



Current Reference Period: Third Quarter 1981

Seasonally adjusted annual rate

CAPITAL EQUIPMENT 274.8 −0.5% +7.1%

Agricultural Machinery & Equip.	303.7	0.5%	9.1%
Air Conditioners (12.77=100)	133.9	0	6.0
Construction Machinery & Equip.	338.1	0.3	9.1
Electric Motors	286.1	0.4	5.7
Environmental Controls (6.80-100)	114.2	1.9	10.4
Fans and Blowers (Ex. Portable)	333.8	0	7.6
Generators and Generator Sets	338.8	0[2]	10.1
Heating Equipment	231.9	(0.1)[2]	6.6
Industrial Material Handling Equip.	287.6	0.5[2]	8.1
Integrating & Measuring Inst.	208.8	0.9	9.5
Internal Combustion Engines	317.9	0.3%	9.3%
Motor Trucks, Light	246.7	(7.9)	1.9
Motor Trucks, Heavy	297.6	0	8.5
Office Machines	150.3	0.7[2]	3.1
Passenger Cars	210.5	(2.2)	5.7
Photographic Equipment	131.2	0	2.7
Pumps, Compressors & Equipment	345.2	1.1	10.3
Railroad Equipment	352.4	0[2]	5.0
Refrig. Compressors (12.77=100)	131.3	0[2]	2.7
Switchgear, Switchboard Equip.	255.7	0.2	3.5

INDUSTRIAL COMMODITIES 316.6 0% +5.2%

Abrasive Products	292.1	2.2%[2]	9.0%
Apparel	191.0	0.5	5.7
Asphalt Roofing	398.8	(0.2)	2.4
Building Paper and Board	231.1	(0.9)	2.4
Coal	529.1	0.6	10.0
Commercial Furniture	271.6	1.9[2]	7.9
Concrete Products	295.6	0.3	3.1
Diesel Fuel (2.72=100)	835.6	(0.3)[2]	5.7
Drugs and Pharmaceuticals	224.9	0[2]	1.2
Electric Lamps Bulbs	279.6	1.6[2]	5.7
Electric Power	392.6	0	13.4
Electronic Components	175.3	0.5	6.8
Fabricated Structural Metal	303.5	0.1	6.3
Finished Lubricants	349.0	0.3[2]	5.4
Finished Steel Products	249.2	(0.1)	8.7
Flat Glass	6.1	0[2]	5.8
Floor Coverings	9.8	0.1	4.6
Footwear	99.2	(0.9)	(0.6)
Footwear, Rubber	21.9	0.2	1.6
Foundry Products	344.3	0.7	6.9
Fuel Oil, No. 2 (2.73=100)	858.8	(1.4)	5.[illegible]
Gasoline	700.4	(1.9)	2.2
Glass Containers	349.6	4.5	12.3
Gypsum Products	255.0	1.8	(0.9)
Hardware	272.5	0.4[2]	5.6
Industrial Chemicals	362.8	(0.3)	3.0
Kerosene (2.73=100)	821.8	(1.4)	4.8
Lumber, Hardwood	258.2	(0.6)	3.3
Lumber, Softwood	319.8	(0.8)%	(7.9)%
Millwork	278.4	0.6	1.7
Mixed Fertilizers	270.5	2.3	3.8
Motor Vehicle Parts	341.7	1.0	9.6
Natural Gas	1219.5	2.0[2]	21.4
Nonferrous Wire and Cable	206.4	(0.1)	(0.6)
Paint Materials	308.6	0	7.5
Paper	289.5	0.2	6.1
Pesticides	458.0	0[2]	21.8
Photographic Supplies	269.8	0.4	(0.5)
Plastic Constr. Prod. (12.69=100)	153.2	0.7	(0.1)
Plastic Film (12.70=100)	206.4	0.1	5.5
Plumbing Fixtures & Brass Fittings	276.1	0.6	6.5
Plywood	235.7	(0.5)	(6.2)
Portland Cement	338.2	0.6	4.3
Prepared Paint	259.3	0[2]	5.2
Refractories	330.9	4.9	12.7
Residual Fuel	1188.9	(3.4)	(4.7)
Sand, Gravel & Crushed Stone	275.4	0.9	7.0
Sanitary Papers & Health Prod.	350.0	0	1.1
Soaps & Synthetic Detergents	250.5	0.3[2]	9.2
Sporting Goods	221.0	0.8	5.0
Structural Clay Products	257.4	0.1[2]	7.3
Tires and Tubes	259.6	1.2	6.6
Tractor Parts	217.2	1.2[2]	8.3
Transformers & Power Regulators	221.1	0.9[2]	13.9
Valves & Fittings	319.9	0.3	5.8
Wiring Devices	321.3	0.8	12.0

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

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JUNE 1982

American City & County

administration ■ engineering ■ operations

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A drop in the MCI as inflation weakens!

On the cover: Symbolically taking its place as the newest member of the municipal workforce is the computer in this photo provided by Wang Laboratories of Lowell, Mass.

Municipal Cost Indexes

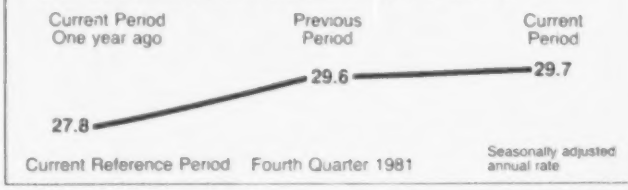
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 304.8 −0.1% +7.1%

Consumer Price Index	283.1	(0.1)%	6.8%
ACC Construction Cost Index	335.9	(0.2)	9.6
ACC Construction Materials	307.4	0.4	4.1
ACC Motorized Equipment	287.5	0	8.8
ACC Energy: Fuels and Power	874.1	(0.1)	3.7
ACC Consumable Supplies	297.5	(0.2)	5.9
Producer Price Index	276.9	(0.2)	4.1

MUNICIPAL TREND TO WATCH

Purchases of Nondurable Goods, Billions of Dollars



CAPITAL EQUIPMENT 275.7 −0.3% +6.8%

Agricultural Machinery & Equip.	304.6	0.3%	8.9%
Air Conditioners (12/77 = 100)	133.9	0	6.0
Construction Machinery & Equip.	337.4	(0.2)	7.9
Electric Motors	287.0	0.3	5.8
Environmental Controls (6/80-100	113.8	(0.4)	10.7
Fans and Blowers (Ex. Portable)	333.8	0	6.4
Generators and Generator Sets	339.7	0.3[2]	10.4
Heating Equipment	233.5	0.7[2]	6.4
Industrial Material Handling Equip	288.4	0.3[2]	5.5
Integrating & Measuring Inst.	210.3	0.7	8.7
Internal Combustion Engines	318.5	0.2%	8.3%
Motor Trucks, Light	249.9	1.3	3.3
Motor Trucks, Heavy	297.7	0	8.8
Office Machines	150.5	0.1[2]	2.7
Passenger Cars	210.3	(0.1)	6.9
Photographic Equipment	134.3	2.4	3.3
Pumps, Compressors & Equipment	346.0	0.2	9.7
Railroad Equipment	352.8	0.1[2]	5.7
Refrig. Compressors (12/77 = 100)	131.3	0[2]	2.7
Switchgear, Switchboard Equip.	258.8	1.2	4.8

INDUSTRIAL COMMODITIES 316.3 −0.1% +3.6%

Abrasive Products	294.9	1.0%[2]	9.3%
Apparel	191.7	0.4	5.7
Asphalt Roofing	392.8	(1.5)	0.6
Building Paper and Board	237.5	(2.8)	4.2
Coal	527.0	(0.4)	9.2
Commercial Furniture	273.9	0.8[2]	8.1
Concrete Products	296.0	0.1	3.2
Diesel Fuel (2/72 = 100)	820.4	(1.8)[2]	(3.8)
Drugs and Pharmaceuticals	224.9	0[2]	1.2
Electric Lamps/Bulbs	276.9	(1.0)[2]	4.1
Electric Power	404.1	2.9	15.1
Electronic Components	175.9	0.3	5.6
Fabricated Structural Metal	304.5	0.3	5.2
Finished Lubricants	349.6	0.2[2]	4.2
Finished Steel Products	349.2	0	6.7
Flat Glass	216.2	0[2]	5.6
Floor Coverings	179.8	0	3.3
Footwear	240.6	0.6	0.1
Footwear, Rubber	225.5	1.6	3.2
Foundry Products	346.0	0.5	7.2
Fuel Oil, No. 2 (2/73 = 100)	829.6	(3.4)	(6.3)
Gasoline	680.2	(2.9)	(8.0)
Glass Containers	355.2	1.6	14.1
Gypsum Products	260.7	2.2	1.2
Hardware	275.7	1.2[2]	6.6
Industrial Chemicals	362.6	(0.1)[2]	2.3
Kerosene (2/73 = 100)	809.0	(1.6)	(5.1)
Lumber, Hardwood	258.4	0.1	3.2
Lumber, Softwood	319.5	(0.1)%	(7.7)%
Millwork	276.4	(0.7)	0.3
Mixed Fertilizers	272.0	0.6	3.1
Motor Vehicle Parts	341.5	(0.1)	9.5
Natural Gas	1249.0	2.4[2]	22.9
Nonferrous Wire and Cable	206.6	0.1	(0.5)
Paint Materials	306.8	(0.6)	5.6
Paper	289.5	0	5.7
Pesticides	458.0	0[2]	19.6
Photographic Supplies	269.8	0	(0.7)
Plastic Constr. Prod. (12/69 = 100)	149.8	(2.2)	(3.3)
Plastic Film (12/70 = 100)	213.6	3.5	9.0
Plumbing Fixtures & Brass Fittings	278.9	1.0	7.5
Plywood	237.1	0.6	(4.7)
Portland Cement	338.2	0	4.3
Prepared Paint	259.3	0[2]	5.2
Refractories	338.4	2.3	14.3
Residual Fuel	1163.0	(2.2)	(12.1)
Sand, Gravel & Crushed Stone	277.7	0.8	7.1
Sanitary Papers & Health Prod.	350.0	0	0.9
Soaps & Synthetic Detergents	250.4	0[2]	5.8
Sporting Goods	221.6	0.3	5.0
Structural Clay Products	257.4	0[2]	5.2
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Valves & Fittings	320.0	0	4.4
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Federal grants dropping fast.

On the cover: Pennsylvania's Butler County Courthouse illustrates how replacement windows can help preserve an historic landmark while dramatically cutting energy costs in this photo provided by window supplier Three Rivers Aluminum Co. of Pittsburgh, Pa.

Parking garages: How much to operate?

Operating cost data collected in a survey of tax-free, open-air, multi-level parking facilities provides a basis of comparison for other municipally owned garages and a way of estimating the expense of operating a proposed structure.

By William C. Arons, P.E.
Senior Vice President
Carl Walker & Associates, Inc.
Minneapolis, Minnesota

Is your city spending too much money to operate its parking garage? Too little? Maybe the garage doesn't even exist yet; it's just a proposal to help revitalize downtown by luring shoppers from suburban shopping malls or to provide relief for residential and commercial streets clogged all day with commuters' cars. How much will it cost to provide garage parking for these cars?

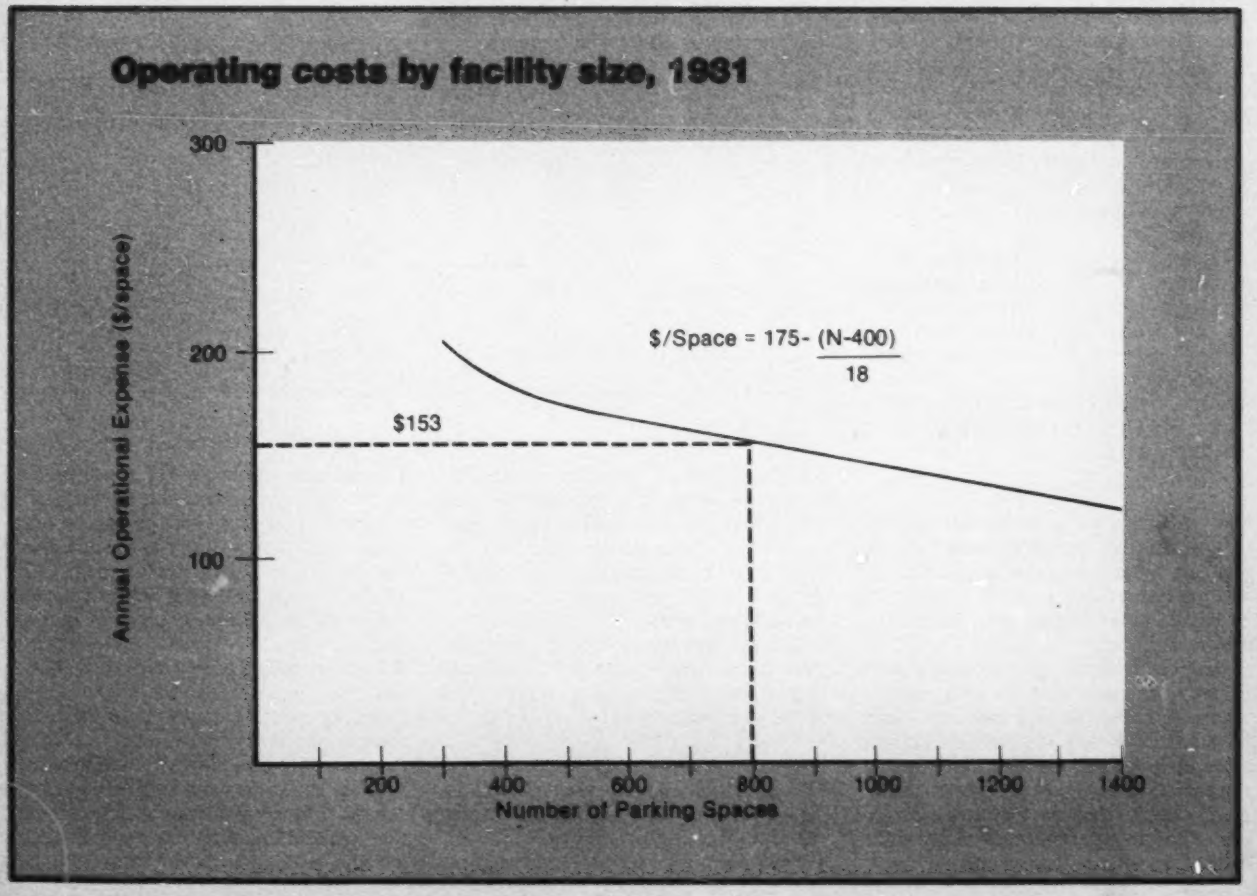
If the garage already exists, its capital costs are known. If it is proposed, an engineering consultant experienced in designing parking garages can provide an accurate estimate of its capital costs. This leaves the question of reasonable operating costs.

Carl Walker & Associates has served as parking garage engineers and consultants to client/owners since 1965. The firm has been involved in the design of approximately 300 parking garages, most of them in the snow-belt of north-central United States. As a continuing practice, Walker contacts its previous owner/clients annually to determine what their operating costs have been, as well as to discover successful or unsuccessful design details.

The 1981 survey included 63 garages in 34 cities, in states ranging from Pennsylvania to Montana and from Missouri to the Canadian border. Cost data was compiled from the responses of approximately 50 owners of these parking facilities. Most of the surveyed structures are multi-level, open-air garages owned either by municipalities or hospitals. Because of this ownership, the survey results did not include consideration of property taxes, depreciation, or debt service.

Cost data were compiled in ten categories, then accumulated into three major and one minor categories. One supposedly "minor" item, however, is a major expense for some garages. Security is disproportionately costly for hospital garages, especially those in congested areas of large cities. Owners of these fa-

The graph below shows the distribution of annual operating cost per space as a function of the number of spaces. The relationship shown is valid only for cashier-operated facilities with from 400 to 1600 spaces. Smaller garages may have operating costs ranging up to $250 per space per year, in 1981 dollars. Older facilities that have not been properly maintained also may have higher operating costs.



cilities may spend as much as $50 per space per year for security. Since the total operating cost of the average large garage is only slightly more than $100 per year, the effect of high security needs becomes apparent.

Except for unusual situations, parking garage major expenses are categorized as cashiering costs, utility costs, and maintenance costs. Of these, cashiering cost represents the largest single component of total operating expenses, constituting from 40 to 60 percent, depending upon the level of service provided to the customers.

Because it represents such a large percentage of total operating costs, cashiering costs should be reevaluated in detail when completing each fiscal year and budgeting for the next. It may be possible to significantly reduce the hours of cashiering with little impact upon income.

Hours of operation will essentially determine the cashiering hours, while the peak-hour exiting volume will determine the number of casher stations. One cashier can process approximately two transactions per minute. This number may be increased if cars can exit readily without traffic backing up to the cashier's booth.

On most days of the year, one fulltime cashier, working perhaps from 10:00 A.M. to 6:30 P.M., coupled with a parttime cashier working from 3:30 P.M. to 9:00 P.M., will be able to operate a 500-car facility. This presumes that roughly 25 percent of the parking is on a monthly basis, and that monthly parkers are provided with a separate exit lane, as is recommended.

Lumped with cashiering expense is administrative cost. Depending upon many factors, including the extent of the parking system controlled by the owner, this cost will vary widely. Adequate supervisory time should be devoted to the facility, and the owner should determine the cost of this effort and include it when calculating operating costs.

The second major expense is the cost of utilities, primarily electricity. In many facilities, this is just for the lighting system. In others, the stair towers and/or elevator towers may be heated electrically.

Walker recommends that these towers be left unheated. This not only reduces operating costs, but eliminates the warm haven that attracts vagrants during periods of inclement weather. Whether or not these vagrants pose a security risk to garage users, they are perceived as undesirable and may reduce the usage of the facility, and hence its revenue.

Survey tabulations show economy of scale

Approximately 50 tax-free multi-level parking garages reported their 1981 operating expenses to Carl Walker & Associates. These expenses were accumulated into four categories. The first includes cashiers' salaries and fringe benefits, plus the costs of administering the garages. The maintenance category includes routine housekeeping, major structural maintenance, maintenance of the elevators and parking machinery, and snow removal. Utility expenses are primarily for electricity for lighting. Other costs include security costs, insurance expenses, and the cost of supplies.

As the table indicates, operating costs per space decrease radically as the size of the garage increases. A garage with fewer than 475 spaces has an operating cost per space 63 percent higher than that of a garage with more than 1000 spaces. The average operating cost for all garages surveyed was $159 per space.

Only in the largest garages does the cashiering and administrative cost fall below half the total operating cost, and then only marginally. Maintenance costs per space are lower in large garages, too, but they are a larger percentage of total operating costs than in smaller garages.

Operating Expense	Up to 475 spaces		475 to 1000 spaces	
	Cost/space	% of total	Cost/space	% of total
Cashiering & Management	108	57	87	51
Maintenance	35	19	36	21
Utilities	33	17	30	18
Other	13	7	18	10
Total	189	100	171	100

Lighting costs are lowest in garages that have been designed in the last few years with a high-pressure sodium vapor lighting system. These garages also have the best overall illumination. A recommended further refinement is to provide for separate controls of the lighting on each level, and to incorporate three subcircuits per floor so that light levels can be controlled, depending upon the season of the year, with timers.

The third major expense item is maintenance. This may be subdivided into three subcategories:

- *Equipment maintenance and repairs.* This includes the cost of service contracts for periodic inspection of elevators, parking control devices, and fire protection equipment. Also included in this category are repairs and parts replacement. An annual service agreement helps to ensure continued satisfactory equipment operation.
- *Routine housekeeping.* As it implies, this category includes washing down and sweeping parking areas; cleaning stair towers, elevator lobbies, restrooms, and cashier booths; window washing; line restriping; landscape maintenance; and snow removal. Major variables in determining the manhours required for housekeeping are the parking turnover ratio and the

More than 1000 spaces	
Cost/space	% of total
57	49
29	25
21	18
9	8
116	100

location of the facility.

■ *Structural system maintenance.* Preventive maintenance of the structural system must have a high priority, especially in northern states where salt is used as a roadway deicer. Deicing salts are carried into the facility and fall onto the concrete floor. Over a period of time, they will penetrate the concrete and cause deterioration that can result in the need for very expensive repairs to a structure that is only a few years old.

A parking structure must be maintained like a bridge, rather than a building. The facility manager should begin to budget funds for structural maintenance from the facility's first year of operation. Although these funds should not be needed during the first three to five years, it is wise to get this budgeting process established and accepted. The resulting accumulation of funds will help to accomplish necessary structural repairs without major budgetary difficulties.

Maintenance expense must be expected to increase each year as the structure ages, and become an increasing percentage of the total operating cost. Walker recommends that owners budget $0.10 per square foot for structural maintenance each year, beginning with the first year of operation. This should reduce excessive costs in subsequent years.

Budgets for older structures should provide for structural system treatment of at least one floor per year. This will provide the necessary cash flow to keep the structure in good condition.

A qualified structural engineer familiar with parking structure design should be retained to inspect the facility biannually. This inspection will disclose the need for repairs before major deterioration necessitates expensive rehabilitation. If the structure is an older one that has not been periodically maintained, non-destructive testing of the concrete should be used to determine the most cost-effective method of treating it, rather than merely applying a random sealer to the entire floor surface.

Among the minor operating expenses are the costs of security, insurance, and supplies. Although special situations — such as the security needs of a hospital garage in an inner city environment — may inflate some costs, the total minor costs approximate nine percent of the operating budget. The usage of the facility, the ratio of contract to hourly parkers, and the location of the facility all influence minor expenses.

Parking, like other services provided to the public, reflects the funds committed to it. In general, expending more money results in providing a higher level of service. This level of service includes such intangibles as comfort, convenience, cleanliness, and security for user and vehicle.

It is accepted doctrine that vehicle owners will park in a facility that is clean, brightly illuminated, and close to areas of substantial commercial or pedestrian activity. Unfortunately, if a facility is poorly utilized, cities often have difficulty in budgeting additional funds to make the garage more attractive to motorists, in the hope that the increased use will bring revenues sufficient to justify the cost of the improvements.

For example, there are times when a second cashier station would reduce waiting time by allowing faster exiting of patrons. Providing a second cashier, however, would substantially increase operating costs. Would the added convenience attract enough revenue to pay the increased costs?

Similarly, more motorists will park in a brightly illuminated facility, particularly in the evening hours. A study can determine whether the additional revenue from these patrons, and perhaps from a higher parking rate, would offset the increase in operating costs. Increasing patronage will also increase the cost of cleaning the parking areas.

Operational expenses, such as cashiering and illumination levels, can be controlled, while revenues can only be projected. If projected revenues do not materialize, the city should have a plan of action to curtail operating expenses.

One major management decision involves the responsibility for the operation of the facility. Should the city operate the garage with its own personnel, or should it contract with a private operator to manage the garage, either for a fixed fee or for a percentage of the gross revenues? There are advantages and disadvantages to either option.

A number of experienced and well qualified operators are located throughout the country. These firms will provide municipal garage owners with detailed proposals for contract operation. It may be prudent for a city that has just constructed its first garage to contract for its operation. Conversely, a city that operates a number of parking facilities, including open lots and metered on-street spaces, may be able to take advantage of shared overhead and expenses and the opportunities for volume-purchase discounts, and find that in-house operation is preferable.

A city that does elect to contract for private parking-garage operation will find that the private operator has a greater incentive to make the operation "profitable." He will minimize expenses and maintain tight control over labor manhours committed to the facility. Walker recommends that the municipality retain control of structural maintenance in order to preserve its investment in the garage. It should also control parking rates, and should establish a system to ensure accountability of daily cash receipts.

While most parking facility projections emphasize the balancing of revenues with expenses, the city should not overlook the possibility of providing free parking. Walker estimates that the annual operating cost for a 500-car garage without cashiering is a maximum of $47 per parking space. If a community is constructing a garage as an aid in competing with free parking in suburban malls, it should consider establishing a special assessment district, in which nearby merchants support the cost of operating the garage as an investment in increased sales. **ACC**

Municipal Cost Indexes

Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967 = 100)

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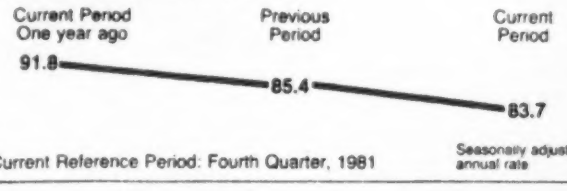
ACC Construction Cost Index	335.9	0	7.2
ACC Construction Materials	308.6	(0.4)	2.6
ACC Motorized Equipment	289.3	0.6	8.4
ACC Energy: Fuels and Power	874.7	0.1	2.2
ACC Consumable Supplies	298.5	0.3	5.2
Producer Price Index	276.9	0	3.1

MUNICIPAL TREND TO WATCH

Federal Grants, Billions of Dollars



Current Reference Period: Fourth Quarter, 1981

CAPITAL EQUIPMENT 277.1 +0.5% +6.3%

Agricultural Machinery & Equip.	306.1	0.5%	8.4%
Air Conditioners (12/77 = 100)	134.1	0.1	5.8
Construction Machinery & Equip.	341.4	1.2	7.7
Electric Motors	287.5	0.2	6.0
Environmental Controls (6/80-100	115.0	1.1	11.7
Fans and Blowers (Ex. Portable)	334.8	0.3	6.6
Generators and Generator Sets	340.6	0.3[2]	9.3
Heating Equipment	235.8	1.0[2]	7.3
Industrial Material Handling Equip	288.7	0.1[2]	4.9
Integrating & Measuring Inst.	211.0	0.3	8.3
Internal Combustion Engines	320.0	0.5%	7.7%
Motor Trucks, Light	250.2	0.1	0.5
Motor Trucks, Heavy	300.1	0.8	9.1
Office Machines	151.0	0.3[2]	2.9
Passenger Cars	209.7	(0.3)	3.8
Photographic Equipment	137.3	2.2	5.6
Pumps, Compressors & Equipment	347.3	0.4	9.8
Railroad Equipment	353.9	0.3[2]	5.4
Refrig. Compressors (12/77 = 100)	131.2	(0.1)[2]	2.6
Switchgear, Switchboard Equip.	259.5	0.3	3.8

INDUSTRIAL COMMODITIES 315.3 −0.3% +1.9%

Abrasive Products	295.5	0.2%[2]	7.8%
Apparel	192.2	0.3	4.3
Asphalt Roofing	385.2	(1.9)	(7.4)
Building Paper and Board	235.5	(0.8)	1.3
Coal	532.5	1.0	9.5
Commercial Furniture	274.5	0.2[2]	7.9
Concrete Products	297.3	0.4	2.6
Diesel Fuel (2/72 = 100)	772.0	(5.9)[2]	(11.5)
Drugs and Pharmaceuticals	225.4	0.2[2]	0.9
Electric Lamps/Bulbs	284.1	2.6[2]	5.7
Electric Power	406.7	0.6	14.4
Electronic Components	176.2	0.2	6.3
Fabricated Structural Metal	305.0	0.2	4.1
Finished Lubricants	350.6	0.3[2]	3.5
Finished Steel Products	351.0	0.5	6.2
Flat Glass	216.2	0[2]	2.9
Floor Coverings	180.3	0.3	2.9
Footwear	243.7	1.3	1.1
Footwear, Rubber	225.4	0	3.2
Foundry Products	345.9	0	6.6
Fuel Oil, No. 2 (2/73 = 100)	760.6	(8.3)	(15.7)
Gasoline	636.9	(6.4)	(15.3)
Glass Containers	357.4	0.6	9.4
Gypsum Products	262.8	0.8	2.3
Hardware	276.2	0.2[2]	6.8
Industrial Chemicals	359.6	(0.8)[2]	(0.8)
Kerosene (2/73 = 100)	772.6	(4.5)	(10.9)
Lumber, Hardwood	259.4	0.4	3.1
Lumber, Softwood	323.7	1.3%	(8.9)%
Millwork	276.4	0	0
Mixed Fertilizers	271.8	(0.1)	3.2
Motor Vehicle Parts	343.3	0.5	9.4
Natural Gas	1276.1	2.2[2]	22.9
Nonferrous Wire and Cable	207.9	0.6	(0.6)
Paint Materials	306.8	0	3.9
Paper	291.7	0.8	6.0
Pesticides	458.0	0[2]	19.6
Photographic Supplies	270.6	0.3	(1.3)
Plastic Constr. Prod. (12/69 = 100)	149.6	(0.1)	(3.5)
Plastic Film (12/70 = 100)	213.3	(0.1)	2.2
Plumbing Fixtures & Brass Fittings	280.3	0.5	5.7
Plywood	234.1	(1.3)	(8.6)
Portland Cement	337.8	(0.1)	1.6
Prepared Paint	259.3	0[2]	4.5
Refractories	339.7	0.4	14.6
Residual Fuel	1179.0	1.4	(11.7)
Sand, Gravel & Crushed Stone	277.5	(0.1)	6.1
Sanitary Papers & Health Prod.	350.0	0	0.9
Soaps & Synthetic Detergents	252.4	0.8[2]	5.3
Sporting Goods	221.9	0.1	5.0
Structural Clay Products	260.7	1.3[2]	6.0
Tires and Tubes	254.4	(0.7)	1.5
Tractor Parts	217.7	0[2]	4.0
Transformers & Power Regulators	222.4	0.3[2]	8.9
Valves & Fittings	321.8	0.6	3.7
Wiring Devices	323.6	0.2	10.4

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

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American City & County

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Special Issue

The Science Of Snowfighting

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ANDRIA SHAPIZ
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Purchases up 4.9% as MCI rises 6.1% for the year.

On the cover: As a reminder of what's to come, a snowplow rolls up Old Man Winter's blessing in this scene provided by the Maine DOT.

Municipal Cost Indexes

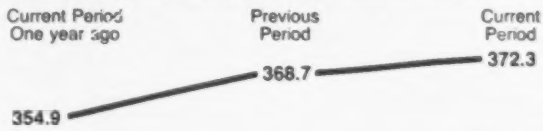
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 307.9 +0.9% +6.1%

Consumer Price Index	287.1	1.0%	6.7%
ACC Construction Cost Index	340.7	1.4	8.1
ACC Construction Materials	328.6	6.5	8.8
ACC Motorized Equipment	290.7	0.5	7.3
ACC Energy: Fuels and Power	875.9	0.1	1.3
ACC Consumable Supplies	296.4	0	5.0
Producer Price Index	277.7	0.3	3.0

MUNICIPAL TREND TO WATCH

Purchases of Goods and Services, Billions of Dollars



Current Reference Period: First Quarter 1982

Seasonally adjusted annual rate

CAPITAL EQUIPMENT 278.3 +0.4% +6.0%

Agricultural Machinery & Equip.	307.0	0.3%	7.5%	Internal Combustion Engines	324.9	1.5%	9.3%
Air Conditioners (12/77 = 100)	134.1	0	5.2	Motor Trucks, Light	260.2	4.0	3.6
Construction Machinery & Equip.	343.4	0.6	7.9	Motor Trucks, Heavy	301.1	0.3	9.3
Electric Motors	287.5	0	5.8	Office Machines	151.0	0[2]	2.9
Environmental Controls (6/80-100	114.5	(0.4)	10.8	Passenger Cars	211.3	0.8	3.1
Fans and Blowers (Ex. Portable)	334.8	0	6.6	Photographic Equipment	130.7	(4.8)	0.3
Generators and Generator Sets	340.9	0.1[2]	9.4	Pumps, Compressors & Equipment	348.6	0.4	8.3
Heating Equipment	237.3	0.6[2]	6.7	Railroad Equipment	349.6	(1.2)[2]	5.6
Industrial Material Handling Equip	288.3	(0.1)[2]	4.0	Refrig. Compressors (12/77 = 100)	131.2	0[2]	2.4
Integrating & Measuring Inst.	212.1	0.8	8.5	Switchgear, Switchboard Equip.	260.0	0.2	4.6

INDUSTRIAL COMMODITIES 314.6 −0.2% +1.3%

Abrasive Products	298.1	0.9%[2]	8.4%	Lumber, Softwood	320.5	(1.0)%	(10.5)%
Apparel	192.7	0.3	4.0	Millwork	275.8	(0.2)	0.4
Asphalt Roofing	384.0	(0.3)	(5.7)	Mixed Fertilizers	271.4	(0.1)	2.1
Building Paper and Board	239.5	1.7	0.9	Motor Vehicle Parts	343.6	0.1	9.4
Coal	534.4	0.4	9.7	Natural Gas	1298.5	1.8[2]	20.1
Commercial Furniture	275.5	0.4[2]	6.9	Nonferrous Wire and Cable	208.2	0.1	0
Concrete Products	297.1	(0.1)	2.0	Paint Materials	306.2	(0.2)	2.0
Diesel Fuel (2/72 = 100)	739.2	(4.2)[2]	(14.8)	Paper	288.8	(1.0)	4.7
Drugs and Pharmaceuticals	226.3	0.4[2]	1.3	Pesticides	458.0	0[2]	19.6
Electric Lamps/Bulbs	288.0	1.4[2]	7.3	Photographic Supplies	270.6	0	(1.3)
Electric Power	405.5	(0.3)	12.5	Plastic Constr. Prod. (12/69 = 100)	145.7	(2.6)	(6.1)
Electronic Components	175.8	(0.2)	6.0	Plastic Film (12/70 = 100)	214.9	0.8	3.0
Fabricated Structural Metal	304.8	(0.1)	3.7	Plumbing Fixtures & Brass Fittings	281.0	0.2	5.6
Finished Lubricants	352.1	0.4[2]	2.8	Plywood	230.6	(1.5)	(7.1)
Finished Steel Products	350.9	0	6.1	Portland Cement	338.5	0.2	1.9
Flat Glass	216.2	0[2]	2.9	Prepared Paint	265.1	2.2[2]	6.0
Floor Coverings	180.5	0.1	0.6	Refractories	340.4	0.2	12.0
Footwear	242.5	(0.5)	0.5	Residual Fuel	1189.4	0.9	(9.8)
Footwear, Rubber	225.5	0	2.9	Sand, Gravel & Crushed Stone	279.4	0.7	6.7
Foundry Products	346.0	0	6.0	Sanitary Papers & Health Prod.	349.3	(0.2)	0.3
Fuel Oil, No. 2 (2/73 = 100)	749.1	(1.5)	(15.7)	Soaps & Synthetic Detergents	252.4	0[2]	5.2
Gasoline	610.0	(4.2)	(18.3)	Sporting Goods	222.7	0.4	5.3
Glass Containers	357.4	0	6.6	Structural Clay Products	258.1	(1.0)[2]	3.2
Gypsum Products	259.4	(1.3)	(0.7)	Tires and Tubes	255.0	0.2	1.5
Hardware	276.7	0.2[2]	6.7	Tractor Parts	219.2	0.7[2]	4.2
Industrial Chemicals	358.1	(0.4)[2]	(2.8)	Transformers & Power Regulators	222.8	0.2[2]	7.9
Kerosene (2/73 = 100)	741.2	(4.1)[2]	(14.1)	Valves & Fittings	322.0	0.1	3.7
Lumber, Hardwood	259.9	0.2	2.3	Wiring Devices	323.7	0	10.5

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

september 1982

American City & County

engineering ■ operations

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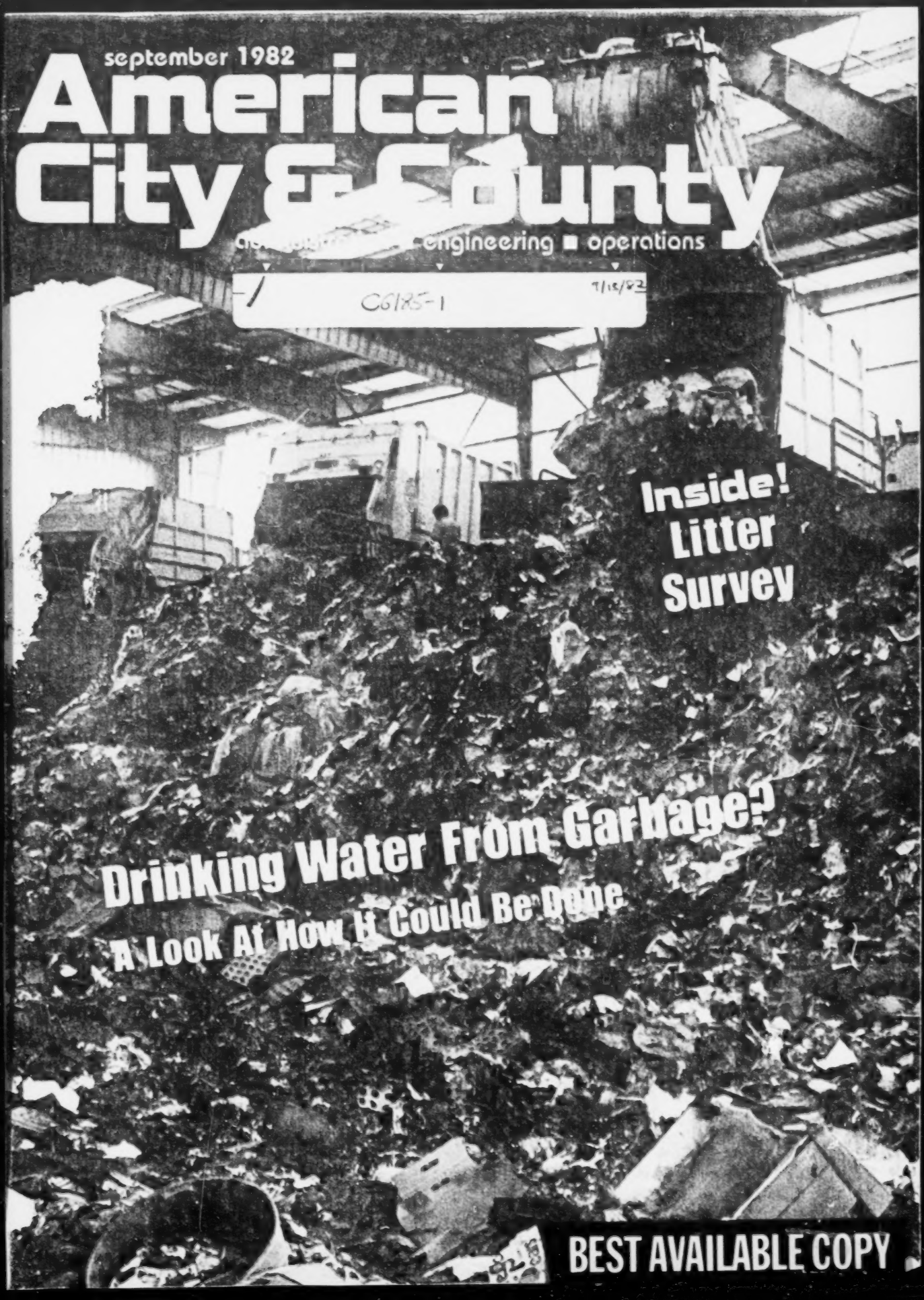

Inside! Litter Survey

Drinking Water From Garbage?

A Look At How It Could Be Done

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American City & County

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On the cover: A proposal to use our heaping piles of refuse to generate power for the local waterworks is the latest idea on how to transform wasted waste into a valuable resource.

On the road again—litter

An Ohio study takes a scientific look at the composition of roadside and public park litter and the rate at which it accumulates.

By Helen L. Belencan
Engineer
Systech Corporation
Xenia, Ohio

Thirteen states have funded litter surveys such as Ohio's to identify areas of high litter generation and target collection resources.

Wearing fringed and beaded buckskins, the Indian slowly rides his horse, not into the sunset, but to the edge of a freeway, where he sadly surveys the litter-covered roadside.

Everyone with a television set has seen Iron Eyes Cody, representing Keep America Beautiful, Inc., make his silent plea for litter elimination. In states where a "Bottle Bill" has been placed on the ballot, litter reduction is argued with less subtlety. No one disputes the extent of the litter problem, but the statistics quoted by the environmentalists on one side, and by bottle manufacturers, labor unions, and beverage bottlers on the other, indicate little agreement on the facts about litter.

In addition to proposing bottle bills, manditory deposit fees on all soft drink and beer containers, various states have enacted three other types of legislation designed to cut the cost of litter clean-up:

- Establishing taxes to generate funds for public education, litter collection, and litter control programs;
- Prohibiting the use of litter-stream articles, such as pull tabs and plastic can connectors;
- Requiring all containers to be reusable, recyclable, or biodegradable.

The federal government has also taken aim at the estimated $1.0 billion annual cost of litter control. The Senate Committee on Commerce, Science, and Transportation is considering the institution of a national bottle bill that would set a minimum five-cent deposit on all carbonated beverage containers, along with a restriction on detachable openings (pull tabs).

Thirteen states have funded litter surveys, either to provide baseline data prior to enacting legislation, to test the effectiveness of particular legislation, or to provide financial support for agencies responsible for litter collection. Properly executed, a litter survey can identify major litter constituents, determine the primary areas of litter concentration, establish the litter generation rate, and determine weight and volume parameters, as well as item counts.

Each of these survey results has a practical benefit. Identifying the major litter constituents can aid in the selection of control or packaging legislation. Identifying the areas of high litter generation enables clean-up efforts to be directed more effectively. Knowing the litter generation rate allows for the most cost-effective clean-up scheduling. The weight and volume parameters determine the resources needed for collection, as well as the potential value of litter as a recyclable material.

In Ohio, the Litter Control Act of 1980 mandated a litter survey. This act established an Office of Litter Control within the Department of Natural Resources, and funded the office through a two-tier addition to the corporate franchise tax. It also placed an added tax on all manufacturers and sellers of litter-stream products.

About 80 percent of the appropriated funds will be awarded to local governments. In 1982, 37 municipalities, 38 counties, 2 townships, and 2 nonprofit organizations were awarded grants totaling $4.1 million. The grants provided funds for such programs as public education, the purchase of litter receptacles, cleanup, and collection/recycling.

In February 1981, Ohio solicited competitive bids for the services of a contractor to perform its first statewide comprehensive litter survey. Systech, of Xenia, Ohio, was the successful bidder.

The survey was to be performed before any of the grant programs were initiated, so that baseline data would be available

to measure program effectiveness. The Office of Litter Control wanted the survey to produce data that would assist in selecting the most effective approaches to litter control, determine trends in litter reduction resulting from the grant-funded control programs, and determine the quantities of recyclable litter.

Properly executed, a litter survey must be accomplished using the same requirements as any other scientific study. There must be no bias or prejudice, the survey must be designed scientifically, and quality control procedures must be followed throughout the program.

After reviewing other studies, Systech designed a survey that drew upon their strong points, while increasing the engineering — as opposed to the social and political—aspects. The selected procedure was based upon the statistical design theories of stratified random sampling and otimum allocation. One phase of the project would characterize litter along Ohio roadways, while the other would characterize litter in specific use areas of state parks.

The litter collected from each of the roadway and recreation-area sites was classified in three ways:

- By item count, into 34 categories;
- By weight, into one of 17 categories;
- By volume, into seven categories.

Because of the differences between roadway and park litter, several groupings were added to the "count" categories to accurately represent park litter. In addition, "fines" was eliminated from the park-litter categories, as well as from the "item" tabulation of roadway litter.

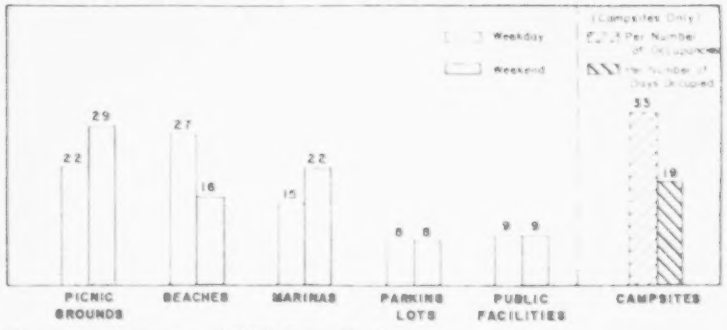
The roadway litter survey began on 8 June and ended on 3 July last year. During that period, litter was collected from 206 roadway sites, each 0.1 mile in length. The sites were randomly selected from Ohio DOT's computerized roadway log.

Litter was collected twice from each site. During the first two weeks of the project, the collected litter represented accumulated litter. The second collection, made during the second two weeks, was to determine the characteristics of "fresh" litter and rate of accumulation.

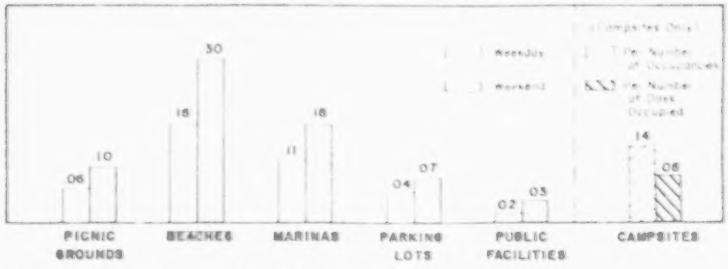
During the four-week period, project workers collected 53,995 items weighing 4.1 tons and having a volume of 808 cubic feet. The estimated rate of litter accumulation along Ohio highways was 165 items per mile per week. The accumulated litter was highest in plastic items by count, in glass items by weight, and in paper items by volume. In the fresh litter, paper items predominated by both count and volume, while glass litter again was the most prevalent by weight.

In the second phase of the project, which began 10 August and ended 3 September, litter was collected from six different use areas in each of 18 state parks.

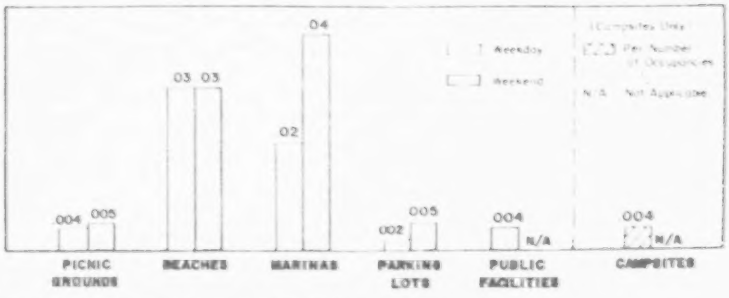
Recreation Area Litter Generation Rates



Items per day per 10,000 sq. feet



Pounds per day per 10,000 sq. feet



Cubic feet per day per 10,000 sq. feet

The use areas were beaches, picnic areas, marinas, parking lots, public facilities, and campsites. The randomly selected survey sites each measured 10,000 square feet, except for campsites.

Litter was collected from each area for eight consecutive days, to provide data on weekday and weekend accumulation rates. Campsite data included the number of different occupancies during the time period. The researchers chose to collect recreational area litter daily so that their efforts could best coordinate with normal park maintenance practices, and also so that uncollected litter accumulations would not become unsightly.

At the end of each eight-day collection period, the litter was transported to Systech, where a sorting crew counted a total of 29,023 items weighing 166 pounds and having a volume of 27 cubic feet.

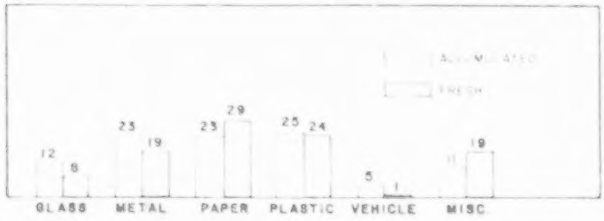
Recreation area litter differed significantly from roadside litter. For example, while the number of items picked up in the park areas was slightly more than half the number picked up along roadsides, the volume was only three percent of the volume of roadway litter, and the weight, only two percent. The reason was that recreational area litter generally was such small items as pull tabs, bottle caps, and pieces of plastic utensils or drinking cups.

Throughout both studies, quality con-

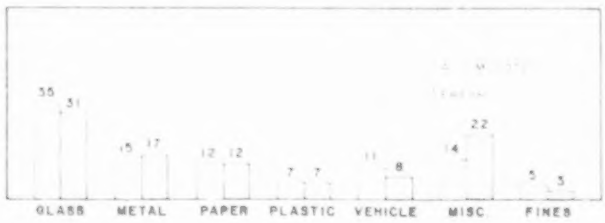
Litter Sorting Categories

Glass
Soft drink bottles
  Returnable
  Nonreturnable
Beer bottles
  Returnable
  Nonreturnable
Liquor/wine bottles
Other
Metal
Soft drink cans
  Aluminum
  Ferrous
  Bimetalic
Beer Cans
  Aluminum
  Ferrous
  Bimetallic
Other
  Aluminum
  Ferrous
  Bimetallic
  Unidentifiable
Paper
Newspaper
Magazines/books
Corrugated cardboard
Packaging
  Fast food
  Other
Plastic
Bottles
  Soft drink (PET)
  Other
Packaging
Fast food
  Other
Six-pack connectors
Other
Vehicle related
Parts
Tires
Miscellaneous
Cigarette/tobacco packaging
Cloth
Lumber
Rubber
Other

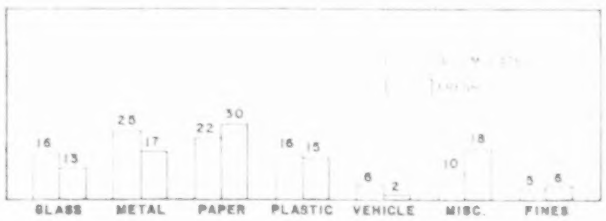
Composition of Roadside Litter, %



By type of Item



By weight



By volume

trol was a major consideration. Crew leaders inspected the sample sites for missed items, and the program manager made spot checks. Bags of collected litter were double-tagged to ensure that all litter was accounted for. After sorting was complete, an independent crew recounted 10 percent of the roadway and 10 percent of the park samples to verify the accuracy of the original counts.

Estimates of litter recyclability were made on the basis of the samples of fresh litter only. Accumulated litter was often found to be severely decomposed and contaminated with dirt and debris, which would greatly limit its recyclability. Moreover, using the data from fresh litter provided the accumulation rates necessary for estimating recycling potential.

The 110,065 miles of Ohio roadway are estimated to be accumulating fresh recyclable litter at the rate of 1,440,000 pounds per week, or 13 pounds per mile per week. Recyclable materials were found to be 53 percent glass, 30 percent metal, 11 percent rubber tires, 4 percent corrugated cardboard, and 2 percent newspaper.

The recreation area study showed that the highest rate of weekend litter accumulation was in picnic areas, at 29 items per day per 10,000 square feet. Weekday accumulations were greatest at beach areas: 27 items per day per 10,000 square feet.

Using the baseline data provided by the survey, Ohio's Office of Litter Control will be able to measure the effectiveness of newly instituted litter control programs that are aimed at changing the habits of our throwaway society. A resurvey, planned for the summer of 1983, will determine changes in litter generation rates and in litter characteristics.

Any city or county government considering the implementation of a litter control program should weigh the advantages of a similar litter survey. This procedure allows programs to be based on actual existing conditions, and provides a mechanism for assessing the effectiveness of any control measures implemented. **ACC**

Municipal Cost Indexes

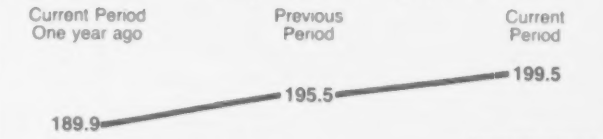
Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

ACC MUNICIPAL COST INDEX 309.7 +0.6% +6.0%

Consumer Price Index	290.6	1.2%	7.1%
ACC Construction Cost Index	340.5	(0.1)	7.3
ACC Construction Materials	310.0	(5.7)	2.1
ACC Motorized Equipment	292.4	0.6	6.9
ACC Energy: Fuels and Power	901.6	2.9	4.6
ACC Consumable Supplies	298.4	0	4.6
Producer Price Index	279.9	0.8	3.5

MUNICIPAL TREND TO WATCH

Indirect Business and Property Tax Receipts, Billions



Current Reference Period: First Quarter 1982

Seasonally adjusted annual rate

CAPITAL EQUIPMENT 279.6 +0.5% +6.0%

Agricultural Machinery & Equip.	308.8	0.6%	7.7%	Internal Combustion Engines	325.3	0.1%	9.1%
Air Conditioners (12/77 = 100)	133.9	(0.1)	4.2	Motor Trucks, Light	267.9	3.0	6.7
Construction Machinery & Equip.	343.7	0.1	7.4	Motor Trucks, Heavy	302.4	0.4	7.0
Electric Motors	288.0	0.2	5.5	Office Machines	151.6	0.4[2]	3.3
Environmental Controls (6/80-100	114.4	(0.1)	9.8	Passenger Cars	214.6	1.6	4.5
Fans and Blowers (Ex. Portable)	334.8	0	5.0	Photographic Equipment	130.3	(0.3)	0
Generators and Generator Sets	340.9	0[2]	8.2	Pumps, Compressors & Equipment	347.3	(0.4)	7.5
Heating Equipment	238.6	0.5[2]	6.8	Railroad Equipment	349.6	0[2]	5.5
Industrial Material Handling Equip	286.9	(0.5)[2]	3.7	Refrig. Compressors (12/77 = 100)	131.2	0[2]	2.4
Integrating & Measuring Inst.	212.8	0	8.4	Switchgear, Switchboard Equip.	261.2	0.5	4.1

INDUSTRIAL COMMODITIES 314.8 +0.1% +1.2%

Abrasive Products	298.1	0%[2]	7.7%	Lumber, Softwood	326.6	1.9%	(8.5)%
Apparel	193.0	0.2	3.7	Millwork	280.1	1.6	2.9
Asphalt Roofing	388.8	1.3	(9.3)	Mixed Fertilizers	271.5	0	2.3
Building Paper and Board	239.4	0	0.8	Motor Vehicle Parts	343.6	0	9.3
Coal	534.1	(0.1)	8.6	Natural Gas	1336.2	2.9[2]	19.4
Commercial Furniture	276.2	0.3[2]	7.1	Nonferrous Wire and Cable	204.4	(1.8)	(0.8)
Concrete Products	297.9	0.3	1.5	Paint Materials	304.2	(0.7)	1.1
Diesel Fuel (2/72 = 100)	759.6	2.8[2]	(12.0)	Paper	288.2	(0.2)	3.5
Drugs and Pharmaceuticals	226.3	0[2]	1.3	Pesticides	462.6	1.0[2]	3.8
Electric Lamps/Bulbs	287.5	(0.2)[2]	6.5	Photographic Supplies	270.6	0	(1.3)
Electric Power	406.6	0.3	10.9	Plastic Constr. Prod. (12/69 = 100)	148.6	2.0	(4.4)
Electronic Components	175.9	0.1	5.1	Plastic Film (12/70 = 100)	219.9	0	2.8
Fabricated Structural Metal	305.2	0.1	3.5	Plumbing Fixtures & Brass Fittings	282.5	0.5	5.1
Finished Lubricants	352.3	0.1[2]	2.7	Plywood	238.9	3.6	(5.0)
Finished Steel Products	348.6	(0.7)	5.3	Portland Cement	338.5	0	2.3
Flat Glass	216.2	0[2]	2.8	Prepared Paint	265.1	0[2]	6.0
Floor Coverings	180.7	0.1	0	Refractories	340.9	0.1	11.0
Footwear	243.8	0.5	1.0	Residual Fuel	1227.2	3.2	(2.3)
Footwear, Rubber	226.1	0.3	3.1	Sand, Gravel & Crushed Stone	279.8	0.1	6.5
Foundry Products	345.2	(0.2)	4.8	Sanitary Papers & Health Prod.	352.0	0.8	1.1
Fuel Oil, No. 2 (2/73 = 100)	798.4	6.6	(10.4)	Soaps & Synthetic Detergents	252.4	0[2]	4.9
Gasoline	636.5	4.3	(14.4)	Sporting Goods	222.9	0.1	5.5
Glass Containers	357.4	0	6.6	Structural Clay Products	258.4	0.1[2]	3.1
Gypsum Products	256.4	(1.2)	(1.6)	Tires and Tubes	255.3	0.1	1.6
Hardware	277.9	0.4[2]	7.0	Tractor Parts	223.6	2.0[2]	6.4
Industrial Chemicals	352.9	(1.5)[2]	(4.5)	Transformers & Power Regulators	223.1	0.1[2]	7.1
Kerosene (2/73 = 100)	773.5	4.4[2]	(9.8)	Valves & Fittings	321.6	(0.1)	3.3
Lumber, Hardwood	265.0	2.0	3.6	Wiring Devices	322.7	(0.3)	7.8

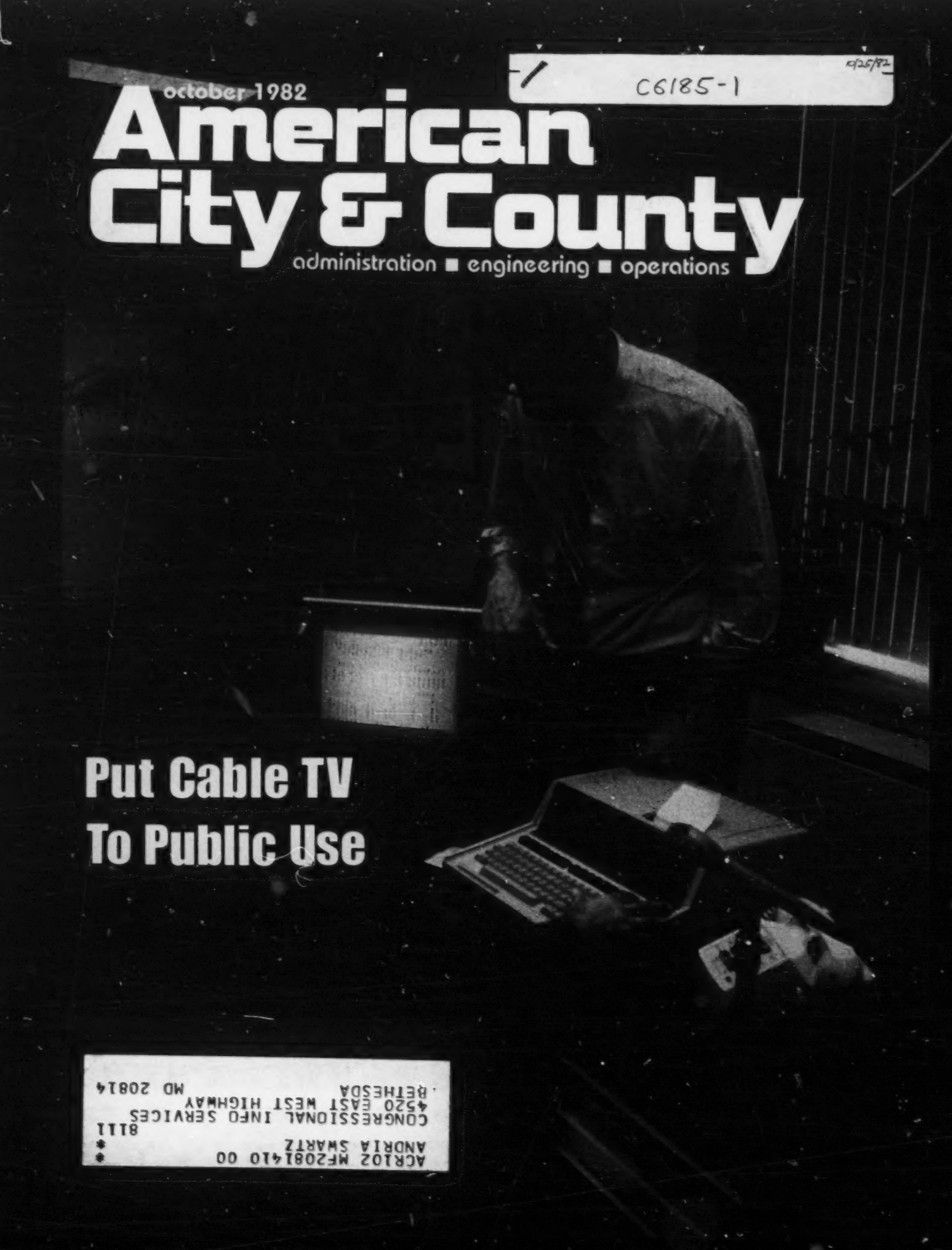
1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted

1 C6185-1 10/26/82

october 1982

American City & County

administration ■ engineering ■ operations



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Municipal Cost Indexes

Cost Index Figures of the Month, showing 30-day[1], 12-month changes (1967=100)

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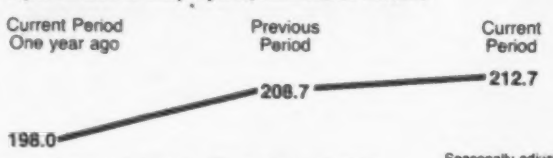
ACC Construction Materials	311.2	0.4	2.7
ACC Motorized Equipment	290.4	(0.7)	5.5
ACC Energy: Fuels and Power	929.4	3.1	7.6
ACC Consumable Supplies	297.9	(0.2)	4.0
Producer Price Index	281.7	0.6	3.6

MUNICIPAL TREND TO WATCH

Compensation of Employees, Billions of Dollars



Current Reference Period: **First Quarter 1982**

Seasonally adjusted annual rate

CAPITAL EQUIPMENT 280.9 +0.5% +5.8%

Agricultural Machinery & Equip.	310.2	0.5%	7.7%
Air Conditioners (12/77 = 100)	135.5	1.2	3.8
Construction Machinery & Equip.	346.1	0.7	6.9
Electric Motors	288.0	0	3.1
Environmental Controls (6/90-100	114.6	0.2	8.4
Fans and Blowers (Ex. Portable)	334.0	(0.2)	2.8
Generators and Generator Sets	343.7	0.8[2]	8.9
Heating Equipment	239.1	0.2[2]	5.6
Industrial Material Handling Equip	286.7	(0.1)[2]	2.8
Integrating & Measuring Inst.	213.1	0.1	6.7
Internal Combustion Engines	326.9	0.5%	8.2%
Motor Trucks, Light	266.1	(0.7)	5.3
Motor Trucks, Heavy	—	—	—
Office Machines	151.9	0.2[2]	2.6
Passenger Cars	215.0	0.2	4.9
Photographic Equipment	130.3	0	1.6
Pumps, Compressors & Equipment	347.4	0	6.0
Railroad Equipment	349.3	(0.1)[2]	3.3
Refrig. Compressors (12/77 = 100)	131.2	0[2]	2.4
Switchgear, Switchboard Equip.	260.7	(0.2)	3.9

INDUSTRIAL COMMODITIES 316.4 +0.5% +1.2%

Abrasive Products	298.0	0%[2]	7.3%
Apparel	193.1	0.1	3.2
Asphalt Roofing	392.3	0.9	(7.0)
Building Paper and Board	239.2	(0.1)	1.6
Coal	538.6	0.8	6.5
Commercial Furniture	277.8	0.6[2]	7.6
Concrete Products	298.2	0.1	1.6
Diesel Fuel (2/72 = 100)	794.8	4.6[2]	(7.1)
Drugs and Pharmaceuticals	—	—	—
Electric Lamps/Bulbs	285.2	(0.8)[2]	6.2
Electric Power	416.9	2.5	11.3
Electronic Components	175.8	(0.1)	3.3
Fabricated Structural Metal	303.8	(0.5)	2.0
Finished Lubricants	350.9	(0.4)[2]	1.6
Finished Steel Products	349.1	(0.2)	1.2
Flat Glass	226.1	4.6[2]	3.6
Floor Coverings	180.1	(0.3)	(1.5)
Footwear	241.7	(0.9)	(0.3)
Footwear, Rubber	226.1	0	2.5
Foundry Products	345.6	0.1	4.5
Fuel Oil, No. 2 (2/73 = 100)	841.1	5.3	(4.3)
Gasoline	686.2	7.8	(6.5)
Glass Containers	357.4	0	6.5
Gypsum Products	255.8	(0.2)	(1.5)
Hardware	278.9	0.4[2]	5.7
Industrial Chemicals	349.7	(0.9)[2]	(5.6)
Kerosene (2/73 = 100)	810.8	4.8	(3.9)
Lumber, Hardwood	265.4	0.2	3.0
Lumber, Softwood	331.8	1.6%	(5.7)%
Millwork	281.8	0.6	3.0
Mixed Fertilizers	271.6	0	1.8
Motor Vehicle Parts	343.8	0.1	8.4
Natural Gas	1367.7	2.4[2]	18.8
Nonferrous Wire and Cable	202.0	(1.2)	(1.8)
Paint Materials	304.3	0	(0.1)
Paper	287.0	(0.4)	2.6
Pesticides	—	—	—
Photographic Supplies	270.5	0	(1.3)
Plastic Constr. Prod. (12/69 = 100)	146.7	(1.3)	(5.7)
Plastic Film (12/70 = 100)	213.4	(0.7)	3.3
Plumbing Fixtures & Brass Fittings	283.0	0.2	4.5
Plywood	232.4	(2.7)	(6.2)
Portland Cement	337.6	(0.3)	1.8
Prepared Paint	265.1	0[2]	5.7
Refractories	340.9	0	11.0
Residual Fuel	1246.9	1.6	3.4
Sand, Gravel & Crushed Stone	279.8	0	6.5
Sanitary Papers & Health Prod.	351.2	(0.2)	0.9
Soaps & Synthetic Detergents	252.4	0[2]	4.9
Sporting Goods	224.5	0	4.3
Structural Clay Products	258.8	0.8[2]	3.1
Tires and Tubes	255.6	0.1	3.6
Tractor Parts	227.4	1.7[2]	7.0
Transformers & Power Regulators	223.2	0[2]	6.1
Valves & Fittings	323.3	0.5	3.4
Wiring Devices	323.6	0.3	7.8

1) Thirty-day figures seasonally adjusted, except where noted 2) Not seasonally adjusted